#### **ORDINANCE NO. 3792**

AN ORDINANCE OF THE CITY OF EDMONDS, WASHINGTON, REPEALING AND REENACTING CHAPTER 18.30 <u>STORM WATER MANAGEMENT</u> OF THE EDMONDS COMMUNITY DEVELOPMENT CODE, PROVIDING FOR THE APPLICATION OF EXISTING CHAPTER 18.30 TO VESTED PERMITS, AND FIXING A TIME WHEN THE SAME SHALL BECOME EFFECTIVE.

WHEREAS, changes in state and federal regulatory law, most prominently the Western Washington Phase II Municipal Storm Water Permit issued by the Department of Ecology, require amendment of the City's storm water management policies; and

WHEREAS, public hearings were held regarding this matter on April 20, 2010, NOW, THEREFORE,

THE CITY COUNCIL OF THE CITY OF EDMONDS, WASHINGTON, DO ORDAIN AS FOLLOWS:

Section 1. The Edmonds Community Development Code, Chapter 18.30 Storm

Water Management is hereby repealed (see Section 2 of this ordinance) and reenacted to read as follows:

## Chapter 18.30 STORMWATER MANAGEMENT

#### Sections:

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#### 18.30.000 Purpose

- A. To protect water resources, reduce the discharge of pollutants to the maximum extent practicable, and satisfy the state requirement under Chapter 90.48 RCW to apply all known, available, and reasonable methods of prevention, control, and treatment ("AKART") to stormwater runoff prior to discharge to receiving waters.
- B. To control stormwater runoff generated by development, redevelopment, construction sites, or modifications to existing stormwater systems that directly or indirectly discharge to the City stormwater system, in a manner that complies with the *Western Washington Phase II Municipal Stormwater Permit* issued by the Department of Ecology.
- C. To protect land and the ecological balance of receiving water bodies near development sites from increased surface water runoff rates and durations that could cause flooding or erosion, scouring, and deposition of sediment (caused by development).
- D. To protect private and public property and city streets and rights-of-way (including easements) from flooding or erosion due to development activity.
- E. To provide for inspection and maintenance of stormwater facilities in the city to ensure that these facilities perform as designed.
- F. To require that all public and private stormwater facilities be operated, maintained, and repaired in a manner that conforms to this chapter.
- G. To establish the minimum standards that must be met for compliance.
- H. To provide guidelines for all who inspect and maintain stormwater facilities.
- I. To promote development practices that ensure the above purposes are met.

#### **18.30.010 Definitions**

For the purposes of this chapter, the following definitions shall apply:

- A. "Adjustment" means a variation in the application of a Minimum Requirement to a particular project. Adjustments provide substantially equivalent environmental protection.
- B. "Approval" means the proposed work or completed work conforming to this chapter as approved by the Public Works Director or their designee.
- C. "Applicant" means the owning individual(s) or corporations or their representatives applying for the permits or approvals described in this Chapter.
- D. "Best management practice (BMP)" means the schedule of activities, prohibition of practices, maintenance procedures, and structural or managerial practices approved by the City that, when used singly or in combination, prevent or reduce the release pollutants and other adverse impacts to waters of Washington State.
- E. "City's Municipal Separate Storm Sewer System or MS4" means a conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains) that are owned or operated by the City of Edmonds, designed or used for collecting or conveying stormwater, and are not a combined sewer nor part of a Publicly Owned Treatment Works as defined in 40 Code of Federal Regulations (CFR) 122.2.
- F. "Clearing" means the act of cutting or removing vegetation, including grubbing.
- G. "Common plan of development or sale" means a site where multiple separate and distinct construction activities may take place at different times on different schedules, but still under a single plan. For example: phased projects and projects with multiple filings or lots, even if the separate phases or filings/lots will be constructed under separate contract or by separate owners (e.g., a development where lots are sold to separate builders); a development plan that may be phased over multiple years, but is still under a consistent plan for long-term development; or projects in a contiguous area that may be unrelated but still under the same contract, such as construction of a building extension and a new parking lot at the same facility.
- H. "Construction Activity" means land-disturbing operations including clearing, grading, or excavation that disturbs the surface of the land. Such activities may include road construction, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

- I. "Converted Pervious Surface" means the change in land cover changed from native vegetation to lawn, landscape, or pasture areas.
- J. "Creek" is synonymous with "stream", which is defined in ECDC 23.40.320.
- K. "Critical areas" is defined in ECDC 23.40.320.
- L. "Design storm" means a rainfall event or pattern of events for use in analyzing and designing drainage facilities.
- M. "Detention" means a facility for controlling stormwater runoff for a prescribed design storm and releasing the stormwater at a prescribed rate.
- N. "Director" means the Public Works Director or a designee with an appropriate background in engineering or another related discipline.
- O. "Earth material" means any rock, natural soil, fill, or any combination thereof.
- P. "Ecology" means the Washington State Department of Ecology.
- Q. "Effective impervious surface" means those impervious surfaces that are connected via sheet flow or discrete conveyance to a drainage system including the City's MS4. Impervious surfaces on residential development sites are considered ineffective if the runoff is dispersed through at least one hundred feet of native vegetation in accordance with BMP T5.30 "Full Dispersion," as described in Chapter 5 of Volume V of the Stormwater Management Manual for Western Washington (2005).
- R. "Erosion" means the displacement of any earth material of existing vegetation by rainfall, stormwater runoff, or seepage.
- S. "Excavation" means the removal of any earth material.
- T. "Exception" means relief from the application of a Minimum Requirement to a project.
- U. "Fill" means a deposit of earth material placed by artificial means.
- V. "Groundwater" means water in a saturated zone or stratum beneath the land surface or below a water body.
- W. "Highway" means a main public road connecting towns and cities. In Edmonds, this includes State Highway 99 and portions of State Highway 104, both classified as Principal Arterials in the City's Comprehensive Transportation Plan.
- X. "Illicit discharge" means any direct or indirect nonstormwater discharge to the City's MS4, groundwaters, or a water body, except as expressly allowed by Chapter 7.200 of Edmonds City Code.

- Y. "Impervious surface" means a hard surface area that either prevents or retards the entry of water into the soil mantle as it occurs under natural conditions prior to development, resulting in stormwater runoff from the surface in greater quantities or at an increased rate of flow compared to stormwater runoff characteristics under natural conditions prior to development. Common impervious surfaces include (but are not limited to) rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and oiled macadam or other surfaces that similarly impede the natural infiltration of stormwater. Open, uncovered retention/detention facilities shall not be considered impervious surfaces for purposes of determining whether the thresholds for application of minimum requirements are exceeded. However, open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling. Outdoor swimming pools shall be considered impervious surfaces in all situations.
- Z. "Lake" means an inland body of fresh water surrounded by land.
- AA. "Land-disturbing activity" means any activity that results in movement of earth, or a change in the existing soil cover (both vegetative and non-vegetative) or the existing soil topography. Land-disturbing activities include, but are not limited to clearing, grading, filling, and excavation. Compaction that is associated with stabilization of structures and road construction shall also be considered a land-disturbing activity. Vegetation maintenance practices are not considered land-disturbing activity.
- BB. "Low Impact Development" means development conducted in a way that seeks to minimize or completely prevent alterations to the natural hydrology of the site. Low impact development includes site planning and design to reduce alterations of natural soil and vegetation cover, minimize impervious surfaces, and specific practices that help to replicate natural hydrology such as permeable pavements, green roofs, soil amendments, bioretention systems, and dispersion of runoff.
- CC. "Maintenance" means repair and maintenance activities conducted on currently serviceable structures, facilities, and equipment that involves no expansion or use beyond that previously existing, and results in no significant adverse hydrologic impact. It includes those usual activities taken to prevent a decline, lapse, or cessation in the use of structures and systems. Those usual activities may include replacement of dysfunctional facilities, including cases where environmental permits require replacing an existing structure with a different type

structure, as long as the functioning characteristics of the original structure are not changed.

- DD. "Maximum extent feasible" means the requirement is to be fully implemented, constrained only by the physical limitations of the site, practical considerations of engineering design, and reasonable considerations of financial costs and environmental impacts.
- EE. "MS4" means the City's Municipal Separate Storm Sewer System.
- FF. "Native vegetation" means vegetation comprised of plant species (other than noxious weeds) indigenous to the coastal region of the Pacific Northwest which could have been reasonably expected to occur naturally on the site. Examples include trees such as Douglas fir, western hemlock, western red cedar, alder, big-leaf maple, and vine maple; shrubs such as willow, elderberry, salmonberry, and salal; and herbaceous plants such as sword fern, foam flower, and fireweed.
- GG. "Natural drainage systems and outfalls" means the location of the channels, swales, and other non-manmade conveyance systems as defined by the earliest documented topographic contours existing for the subject property, either from maps or photographs, or such other means as appropriate.
- HH. "New development" means land-disturbing activities, including Class IV general forest practices that are conversions from timber land to other uses per RCW 76.09.050; structural development, including construction or installation of a building or other structure; creation of impervious surfaces; and subdivision, short subdivision, and binding site plans, as defined and applied in Chapter 58.17 RCW. Projects meeting the definition of redevelopment shall not be considered new development. If the project is part of a common development plan or sale, the disturbed area of the entire plan shall be used in determining permit requirements.
- II. "New Impervious Surface" means impervious surface created after July 6, 1977 (the effective date of the City's first drainage control ordinance) that meets the conditions described in the City of Edmonds *Stormwater Supplement* (see Chapter 18.30.060).
- JJ. "Person" means any individual, partnership, corporation, association, organization, cooperative, public or municipal corporation, agency of the state, or local government unit, however designated.
- KK. "Project site" means that portion of a property, properties, or right of way subject to land-disturbing activities, new impervious surfaces, or replaced impervious surfaces. If the project

is part of a common development plan or sale, the disturbed area of the entire plan shall be used in determining permit requirements.

- LL. "Receiving waters" means waterbodies or surface water systems to which surface runoff is discharged via a point source of stormwater or via sheet flow.
- MM. "Redevelopment" means on a site that is already substantially developed, the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including construction, installation, or expansion of a building or other structure; replacement of impervious surface that is not part of a routine maintenance activity; and land-disturbing activities.
- NN. "Replaced impervious surface" means for structures, the removal and replacement of any exterior impervious surfaces or foundation. For other impervious surfaces, means the removal down to bare soil or base course and replacement. For sites with existing single family dwelling units, (as defined in ECDC 21.90.080) a project that solely replaces the other impervious surfaces in-kind (footprint and imperviousness of material does not change), shall not be considered replaced impervious surface for the purposes of this chapter, unless the project site has 1 acre or greater of land-disturbing activities. (Note: These surfaces may qualify as "new impervious surface" see definition.)
- OO. "Roadway" means the traveled impervious portion of any public or private road or street.
- PP. "Site" means the area defined by the legal boundaries of a parcel or parcels of land that is (are) subject to new development or redevelopment. For road projects, or utility projects in the right-of-way, the length of the project site and the right-of-way boundaries define the site.
- QQ. "Slope" means the degree of slant of a surface measured as a numerical ratio, percent, or in degrees. Expressed as a ratio, the first number is the horizontal distance (run) and the second is the vertical distance (rise), as 2:1. A 2:1 slope is a 50 percent slope. Expressed in degrees, the slope is the angle from the horizontal plane, with a 90-degree slope being vertical (maximum) and 45 degrees being a 1:1 or 100 percent slope.
- RR. "Soil" means the unconsolidated mantle of the earth that serves as a natural medium for the growth of land plants.
- SS. "Source control" means a structure or operation that is intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants.

- TT. "Stormwater" means runoff during and following precipitation and snowmelt events, including surface runoff and drainage.
- UU. "Stormwater facility" means a constructed component of a stormwater drainage system, designed and constructed to perform a particular function, or multiple functions. Stormwater facilities include, but are not limited to, pipes, pumping systems, swales, ditches, culverts, street gutters, catch basins, detention basins, wetlands, infiltration devices, and pollutant removal devices.
- VV. "Stormwater site plan" The report and associated plans containing all of the technical information and analysis necessary for the City to evaluate a proposed new development or redevelopment project for compliance with stormwater requirements. Contents of the Stormwater Site Plan will vary with the type and size of the project, and individual site characteristics. It may include a Construction Stormwater Pollution Prevention Plan (Construction SWPPP) and a Permanent Stormwater Control Plan (PSC Plan).
- WW. "Substantially developed" means for sites in zone district RS (as defined Title 16 ECDC) those that have an existing single family dwelling unit (as defined in ECDC 21.90.080). For sites with all other zone districts, substantially developed shall mean those sites with 35 percent or more existing impervious surface coverage.
- XX. "Threshold discharge area" means an onsite area that drains to either a single natural discharge location or multiple natural discharge locations that combine within one-quarter mile downstream (as determined by the shortest flowpath). The examples in Figure 2.1 presented in Volume I of the *Stormwater Management Manual for Western Washington* (2005) illustrate this definition. The purpose of this definition is to clarify how the thresholds of this code are applied to project sites with multiple discharge points.
- YY. "Variance" means the same as "Exception".
- ZZ. "Water body" means a surface water feature, whether standing or flowing, including (but not limited to) sounds, lakes, ponds, rivers, streams, and creeks including waters of the state.
- AAA. "Watershed" means a geographic region within which water drains into a particular river, stream, or water body.
- BBB. "Waters of the state" includes those waters as defined as "waters of the United States" in 40 CFR Subpart 122.2 within the geographic boundaries of Washington State, and "waters of the state" as defined in Chapter 90.48 RCW which includes lakes, rivers, ponds, streams, inland waters, underground waters, salt

waters and all other surface waters and water courses within the jurisdiction of the State of Washington.

CCC. "Wetlands" are as defined in ECDC 23.40.320.

#### **18.30.020** Regulation

- A. The Public Works Director or a designee shall administer this chapter and shall be referred to as the Director. The Director shall have the authority to develop and implement procedures to administer and enforce this chapter.
- B. The Director shall approve and enforce procedures in accordance with state and federal regulations, and compliance with this chapter.

## 18.30.030 Applicability

- A. This chapter applies if any of the following pertains to a site:
- 1. Issuance of a City permit is required under all other chapters of Titles 18 or 19 ECDC.
- 2. A Subdivision application is submitted per ECDC 20.75.040.
  - 3. The proposed project:
- a. Involves 500 square feet or more of land-disturbing activity, new impervious surface, or replaced impervious surface. Routine landscape maintenance practices outside of Critical Areas (as defined in Title 23 ECDC) and ongoing farming or gardening activities shall be excluded unless there is the potential for such an activity to cause an illicit discharge to the City's MS4.
- b. Is a utility or other construction projects consisting of 500 lineal feet or more of trench excavation.
- c. Is located in, adjacent to, or drains into (currently or as a result of the project) a Critical Area or a Critical Area Buffer.
- B. This chapter applies to actions whenever the Director determines there is a potential for:
- 1. An illicit discharge or physical damage to the City's MS4 or downstream properties, or
- 2. A violation of applicable City, State, or Federal laws, regulations, or permits related to water quality.
- C. If a City Permit has been issued or a subdivision application submitted for a site, as provided in Section 18.30.030.A, the requirements of this chapter shall be administered under those permits. If the site activities triggered in Section 18.30.030.A.3 or B of this subchapter do not necessitate City-

issued permit, the requirements of this chapter shall be administered under a Stormwater Permit as described in section 18.30.040.B.2.

- D. The requirements of this chapter are minimum requirements. They do not replace, repeal, abrogate, supersede or affect any other more stringent requirements, rules, regulations, covenants, standards, or restrictions. Where this chapter imposes requirements that are more protective of human health or the environment than those set forth elsewhere, the provisions of this chapter shall prevail. When this chapter imposes requirements that are less protective of human health or the environment than those set forth elsewhere, the provisions of the more protective requirements shall prevail.
- E. The minimum requirements that apply to a project site will differ based on (but are not limited to) the following: project scope and configuration, physical site characteristics, site location, and subsurface conditions. The combination of site activities and physical characteristics will classify the type of project as described in ECDC 18.30.050. Stormwater Management Requirements are described in ECDC 18.30.060.
- F. Approvals and permits granted under this chapter are not waivers of the requirements of any other laws, nor do they indicate compliance with any other laws. Compliance is still required with all applicable federal, state and local laws and regulations, including rules promulgated under authority of this chapter.
- G. Compliance with the provisions of this chapter does not necessarily mitigate all impacts to the environment. Thus, compliance with this chapter should not be construed as mitigating all drainage water or other environmental impacts, and additional mitigation may be required to protect the environment pursuant to other applicable laws and regulations. The primary obligation for compliance with this chapter and for preventing environmental harm on or from property is placed upon the applicant.

#### 18.30.040 Administration

A. Applications. All stormwater review submittals shall contain, in addition to the information required under any other applicable City code, a Stormwater Site Plan as described in the *Stormwater Supplement* (see Chapter 18.30.060) and other information as the Director shall require.

#### B. Review

1. The Director shall review all plans for compliance with this chapter.

- 2. The Director may administratively, without hearing, approve and issue a Stormwater permit when required by ECDC 18.30.030 if the proposed activity complies with requirements in this chapter.
- C. Inspection. All activities regulated by this chapter shall be inspected by the Director. The Director shall inspect projects for approval at various stages of the work to determine that they are being constructed per the approved Stormwater Site Plans. Stages of work requiring inspection include (but are not limited to) preconstruction, installation of BMPs, land-disturbing activities, installation of utilities, landscaping, and completion of project. When reasonably required by the Director to accomplish the purpose of this chapter or to comply with local, state or federal law or regulation on stormwater, a special inspection or testing shall be performed. The drainage system shall be installed concurrently with site development and shall be completed as shown on the approved plan before city approval of an occupancy permit or final inspection.
- D. Fees. Application, Review and Inspection fees as set in Chapter 15.00 ECDC shall be paid.

#### 18.30.050 Project Classification

For purposes of this chapter, projects are classified as Large Site, Small Site, or Minor Site as described below, primarily based in the extent of land-disturbing activities.

- A. Large Site Project. Projects are Large Site Projects if they involve:
  - 1. 1 acre or more of land-disturbing activity, or
- 2. If the project disturbs less than 1 acre of land and it is part of a larger common plan of development or sale where land-disturbing activity involves 1 acre or more.
- B. Small Site Project. Projects are Small Site Projects if are they are not Large Site Projects and they involve:
- 1. 2,000 square feet or greater of new, replaced, or new plus replaced impervious surface area or
- 2. At least 7,000 square feet of land-disturbing activity or
- 3. 50 cubic yards or more of either grading, filling, or excavating as described in ECDC 18.40.000.
- C. Minor Site Project. Projects are Minor Site Projects if they involve:

- 1. 500 square feet or greater of new development or redevelopment including land-disturbing activity and utility projects that cause land disturbance and
  - 2. Are not a Large or Small Site Project

#### 18.30.060 Stormwater Management Requirements

#### A. General

- 1. All activities covered by this chapter shall comply with the site planning and best management selection and design criteria in the *Stormwater Code Supplement to Edmonds Community Development Code (ECDC) Chapter 18.30* (Exhibit A), herein referred to as the *Stormwater Supplement*, to implement the applicable minimum technical requirements listed in this chapter.
- 2. The City may allow alternative or regional approaches to treatment, flow control, or other minimum requirements per the Basin/Watershed provisions of the *Western Washington Phase II Municipal Stormwater Permit*.
- B. Illicit Discharges and Connections. Non-stormwater illicit discharges, including spills into the City's stormwater drainage system, are prohibited per Chapter 7.200 ECC.
- C. Low Impact Development. Low Impact Development techniques shall be employed where feasible, reasonable, and appropriate. When low impact development techniques are employed, the design shall be consistent with the most recent version of the *Low Impact Development, Technical Guidance for Puget Sound* (Puget Sound Action Team and Washington State University Pierce County Extension), other Low Impact Development standards approved by Ecology, or the *Stormwater Supplement*.
- D. Minimum Technical Requirements by Project Classification. The following lists the additional requirements that apply to the specific project classes:
- 1. Large Site Projects. Large Site Projects shall meet the minimum technical requirements outlined in Section 3 and Section 4 of Appendix 1 of the Western Washington Phase II Municipal Stormwater Permit) and the Stormwater Supplement.
- 2. Small Site Projects. Small Site Projects are further defined as Category 1 or Category 2. All new development or redevelopment projects shall, at a minimum, comply with the applicable requirements for Category 1 or Category 2 as found in the *Stormwater Supplement*. Any or all of small site minimum requirements (SSMRs) may be required on any Small Site Project

by the Director to meet the purpose of this Chapter based on site specific factors including, but not limed to, location, soil conditions, slope, and designated use. These requirements are summarized as follows:

- a. Category 1: For Small Site Projects with less than 5,000 square feet of new, replaced, or new plus replaced impervious surface area the following SSMRs shall apply:
- i. SSMR #1 Preparation of Stormwater Site Plan
- ii. SSMR #2 Construction Stormwater Pollution Prevention Plan
  - iii. SSMR #3 Source Control of Pollution
- iv. SSMR #4 Preservation of Natural Drainage Systems and Outfalls
  - v. SSMR #5 Onsite Stormwater Management
- vi. SSMR #7 Flow Control This SSMR may be waived by the Director based on the extent of application of SSMR #5 to infiltrate, disperse, and retain stormwater runoff on site without causing flooding or erosion impact, per the criteria in the *Stormwater Supplement*.

vii. SSMR #8 – Wetland Protection

viii. SSMR#9 - Operation and

#### Maintenance

- ix. SSMR#11 Financial Liability Applies to stormwater systems constructed in or adjacent to Critical Areas or Critical Area buffers.
- b. Category 2: For Small Site Projects that include 5,000 square feet or greater of new, replaced, or new plus replaced impervious surface area; or convert ¾ acre or more of native vegetation to lawn or landscaped area; or, through a combination of creating effective impervious surface and converted pervious surfaces, causes a 0.1 cubic feet per second increase in the 100-year flow frequency from a threshold discharge area as estimated using an approved model. The following SSMRs shall apply:
- i SSMR #1 Preparation of Stormwater Site Plan
- ii. SSMR #2 Construction Stormwater Pollution Prevention Plan
  - i. SSMR #3 Source Control of Pollution
- ii. SSMR #4 Preservation of Natural Drainage Systems and Outfalls
  - iii. SSMR #5 Onsite Stormwater Management
  - iv. SSMR #6 Runoff Treatment.

- v. SSMR #7 Flow Control
- vi. SSMR #8 Wetland Protection
- vii. SSMR #9 Operation and Maintenance
- viii. SSMR #10 Off-Site Analysis and

## Mitigation

- ix. SSMR #11 Financial Liability
- c. Any or all of SSMRs may be required on any Small Site Project by the Director to meet the purpose of this Chapter based on site specific factors including, but not limed to, location, soil conditions, slope, and designated use.
- 3. Minor Site Projects The following Minimum Requirements apply to Minor Site Projects:
- a. Minor Site Construction Stormwater Pollution Prevention Practices as described in the *Stormwater Supplement*.
- b. Additional requirements may be imposed by the Director or designee on Minor Project Sites to meet the purpose of this Chapter based on site specific factors including, but not limed to, location, soil conditions, slope, and designated use.

# 18.30.070 Exemptions, Exceptions, Adjustments and Appeal

- A. **Exemptions.** The following land uses and land-disturbing activities are exempt from the provisions of this chapter:
- 1. Forest practices regulated under Title 222 WAC, except for Class IV general forest practices that are conversions from timber land to other uses, are exempt from the provisions of the minimum requirements.
- 2. Commercial agriculture practices that involve working land for production are generally exempt. However, land conversion from timberland to agriculture, and the construction of impervious surfaces are not exempt.
- 3. Construction of drilling sites, waste management pits, and associated access roads, and construction of transportation and treatment infrastructure such as pipelines, natural gas treatment plants, natural gas pipeline compressor stations, and crude oil pumping stations are exempt. Operators are encouraged to implement and maintain best management practices to minimize erosion and control sediment during and after construction activities to help ensure protection of surface water quality during storm events.
- 4. Roadway Projects. The following roadway maintenance practices or activities are exempt: pothole and squarecut patching, overlaying existing asphalt or concrete pavement

with asphalt or concrete without expanding the area of coverage, shoulder grading, reshaping/regrading drainage systems, crack sealing, resurfacing with in-kind material without expanding the road prism, and roadside vegetation maintenance.

- a. For Large Site Projects only, the following road maintenance practices or activities are considered redevelopment, and therefore are not categorically exempt. The extent to which this exemption applies is explained for each circumstance.
- i. Removing and replacing a paved surface to base course or a lower level, or repairing the roadway base: If impervious surfaces are not expanded, Large Site Project Minimum Requirements #1 #5 apply. However, in most cases, only Large Site Project Minimum Requirement #2, Construction Stormwater Pollution Prevention, shall be required. Where appropriate, project proponents are encouraged to look for opportunities to use permeable and porous pavements.
- ii. Extending the pavement edge without increasing the size of the road prism, or paving graveled shoulders are considered new impervious surfaces and are subject to the minimum requirements that are triggered when the thresholds identified for redevelopment projects are met.
- iii. Resurfacing by upgrading from dirt to gravel, asphalt, or concrete; or upgrading from gravel to asphalt, or concrete; or upgrading from a bituminous surface treatment ("chip seal") to asphalt or concrete: These are considered new impervious surfaces and are subject to the minimum requirements that are triggered when the thresholds identified for redevelopment projects are met.
- 5. Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics are only subject to Minimum Requirement #2, Construction Stormwater Pollution Prevention.
- 6. With respect to replaced impervious surfaces, a redevelopment project may be exempt from compliance with SSMR 6 (treatment), SSMR 7 (flow control), and SSMR 8 (wetlands protection) (or the associated applicable minimum requirements for large sites) should the City adopt a plan and schedule that fulfills those requirements through a regional drainage control plan (e.g., via a regional facility or facilities, stream restoration, or basin-specific development requirements).
- 7. City capital and maintenance projects are exempt from the financial liability minimum requirement.

### B. Exceptions

- 1. The Director may approve a request for an exception to the minimum requirements of this chapter following legal public notice of an application for an exception and of the Director's decision on the application. All legal public notice related to this request for an exception shall be in the manner prescribed in Section 20.03.002 ECDC and the applicant shall pay all costs to publish the legal public notices required by this provision. The Director shall provide and keep a written findings of fact of the decision.
- 2. The approval of the exception shall only be granted when the applicant demonstrates that the exception will not increase risks to public health, safety, and welfare, or to water quality, or to public and private property in the vicinity or downstream of the property, and the exception shall be the least possible exception that could be granted and still provide compliance with the intent of the minimum requirements. In addition, the exception shall only be granted when it has been determined by the director that one or more of the following applies:
- a. The requirement would cause a severe and unexpected financial hardship that outweighs the requirement's benefits, and the criteria for an adjustment cannot be met; or
- b. The requirement would cause harm or a significant threat of harm to public health, safety, and welfare, the environment, or public and private property, and the criteria for an adjustment cannot be met; or
- c. The requirement is not technically feasible, and the criteria for an adjustment cannot be met; or
- d. An emergency situation exists that necessitates approval of the exception.
- 3. An application for an exception on the grounds of severe and unexpected financial hardship shall describe, at a minimum, all of the following:
  - a. The current, pre-project use of the site; and
- b. How application of the requirement(s) for which an exception is being requested restricts the proposed use of the site compared to the restrictions that existed prior to adoption of this chapter; and
- c. The possible remaining uses of the site if the exception were not granted; and
- d. The possible uses of the site that would have been allowed prior to the adoption of this chapter; and

- e. A comparison of the estimated amount and percentage of value loss as a result of the requirements versus the estimated amount and percentage of value loss as a result of requirements that existed prior to adoption of the requirements of this chapter; and
- f. The feasibility of the applicant to alter the project to apply the requirements of this chapter
- 4. An exception to the requirements shall only be granted to the extent necessary to provide relief from the economic hardship as determined by the Director, to alleviate the harm or threat of harm to the degree that compliance with the requirement becomes technically feasible, or to perform the emergency work that the Director determines is warranted.
- 5. The Director may require an applicant to provide additional information at the applicant's expense, including (but not limited to) an engineer's report or analysis.
- 6. When an exception is granted, the Director may impose new or additional requirements to offset or mitigate harm or the threat of harm that may be caused by granting the exception, or that would have been prevented if the exception had not been granted.

## C. Adjustments

- 1. The Director may approve a request for adjustments to the requirements of this chapter when the Director finds that:
- a. The adjustment provides substantially equivalent environmental protection; and
- b. The objectives of safety, function, environmental protection, and facility maintenance are met, based on sound engineering practices.
- 2. During construction, the Director may require, or the applicant may request, that the construction of drainage control facilities and associated project designs be adjusted if physical conditions are discovered on the site that are inconsistent with the assumptions on which the approval was based, including (but not limited to) unexpected soil or water conditions, weather generated problems, or changes in the design of the improved areas; and
- 3. A request by the applicant for an adjustment shall be submitted to the Director for review and approval prior to implementation. The request shall be in writing and shall provide facts substantiating the requirements of subsection C.1, and if made during construction, the factors in subsection C.2. Any such modifications made during the construction of drainage control

facilities shall be included with the final approved drainage control plan.

#### D. Appeal

- 1. The Director's decision on an application for an exception or adjustment may appeal to the Hearing Examiner in accordance with a Type II appeal process in Chapter 20.06 ECDC.
  - 2. The applicant shall carry the burden of proof.
- 3. The decision of the Hearing Examiner is appealable to Superior Court in accordance with Chapter 36.70C RCW.

#### 18.30.080 Easements, Deeds, and Covenants

- A. Easements. A Public Storm Drainage Inspection Easement shall be required where:
- 1. Stormwater facilities identified on project plans will be located on property owned by a party other than the owner of the project site or
- 2. Access is needed to structural or non structural stormwater facilities for inspection by the City to ensure that these stormwater best management practices continue to function as designed.

Easements shall be as specified in Engineering Division documents or approved by the Director, and recorded with Snohomish County and on all proper deeds.

B. Deeds and Covenants for Low Impact Development. Deed restrictions and covenants shall be required for all sites using low impact development techniques to ensure that these stormwater best management practices continue to function as designed. The deed restrictions or covenants shall address or append requirements and responsibilities for long term management and maintenance of these best management practices.

# 18.30.090 Inspection and Maintenance Roles, and Responsibilities

Proper inspection and maintenance of stormwater facilities (including construction BMPs) is essential for the protection of the City's MS4 and the environment. Inspection and maintenance of all stormwater facilities shall be required in accordance with the *Stormwater Supplement*.

A. Stormwater Maintenance and Inspection Standards Stormwater facilities shall be inspected and maintained per the requirements of the *Stormwater Supplement*. For systems which

- do not have a maintenance standard, the owner shall develop a standard based on guidelines from the manufacturer, designer, or a registered professional engineer and submit the standards to the Director for approval.
- B. Ownership. Stormwater facilities are either privately or publicly owned and maintained. All stormwater facilities that serve commercial and industrial sites are private. Storm drainage facilities or controls that are privately owned by a homeowner's association or similar organization also are private.
- Maintenance and Inspection. All privately owned storm drainage facilities or controls shall be maintained by the owner, or the homeowner or owner association ("Owner") if one is established as part of a residential or commercial development. All private storm drainage facilities shall be regularly inspected to ensure proper operation and shall monitor the facility or control as required or as set forth in the Stormwater Supplement. The Owner shall maintain records of inspection and maintenance, disposal receipts, and monitoring results. The records shall catalog the action taken, the person who took it, the date said action was taken, how it was done, results of any monitoring effort, and any problems encountered or follow-up actions required. The records shall be made available to the City upon request. The Owner shall maintain a copy of the Stormwater Operations and Maintenance Manual (if required) on site, and shall make reference to such document in real property records filed with Snohomish County, so others who acquire real property served by the privately owned storm drainage facilities or controls are notified of their obligation to maintain such facilities or controls.
- D. When an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed:
- 1. Within 1 year for wet pool facilities and retention/detention facilities.
- 2. Within 6 months for typical maintenance.
- 3. Within 9 months for maintenance requiring re-vegetation, and
- 4. Within 2 years for maintenance that requires capital construction of less than \$25,000.
- E. Disposal of Waste from Maintenance Activities Disposal of waste from maintenance activities shall be conducted in accordance with the minimum Functional Standards for Solid Waste Handling, Chapter 173-304 WAC, guidelines for disposal of waste materials from storm water maintenance activities, and where appropriate, the Dangerous Waste Regulations, Chapter 173-303 WAC.

F. City Inspection The regular inspection of privately owned storm drainage facilities or controls is essential to enable the City to evaluate the proper operation of the City's MS4 and the environment. The City shall have access to private stormwater facilities for inspection to ensure they are properly operated and maintained in accordance with ECC 7.200.100. The City may offer an incentive program to owners to encourage the proper maintenance of private storm drainage facilities.

#### 18.30.100 Enforcement Procedures

- A. General Enforcement action shall be in accordance with this chapter whenever a person has violated any provision of this chapter. The choice of enforcement action is at the discretion of the City. The severity of any penalty shall be based on the nature of the violation, the damage, or risk to the public or to public resources, or the degree of bad faith of the person subject to the enforcement action.
- B. Notice of Violation and Order to Correct. The Director shall have the authority to serve a person a Notice of Violation and Order to Correct (NOV/OTC) if an action is being undertaken in violation of this chapter. Issuance of any other warning, notice, or order is not a condition precedent for the Director to issue an NOV/OTC.
- 1. Content of NOV/OTC the NOV/OTC shall contain:
- a. A description of the specific nature, extent, and time of violation and the damage or potential damage;
- b. A notice that the violation or the potential violation cease and desist, and, in appropriate cases, the specific corrective action to be taken within a given time;
- c. A civil penalty under ECDC 18.30.090(C) below may be issued with the order.
  - d. Appeal rights.
- 2. Notice. An NOV/OTC may be imposed by a notice in writing, either by certified mail with return receipt requested, or by personal service, to the person(s) shown on the rolls of the Snohomish County assessor as the owner of the site, noted as the applicant on any application for development approval or observed doing regulated activity on the site.
- 3. Effective date. The stop work order issued under this section shall become effective immediately upon receipt by the person to whom the order is directed.
- 4. Compliance. Failure to comply with the terms of an NOV/OTC shall result in additional enforcement actions including

(but not limited to) criminal prosecution, the issuance of additional civil penalty and abatement.

- C. Maintenance Orders. The Director shall have the authority to issue to an owner or person an order to maintain or repair a component of a stormwater facility or BMP to bring it into compliance with this chapter, the *Stormwater Supplement*, and the Edmonds Community Development Code. The order shall include:
- 1. A description of the specific nature, extent and time of the violation and the damage or potential damage that reasonably might occur;
- 2. A notice that the violation or the potential violation cease and desist and, in appropriate cases, the specific corrective actions to be taken; and
- 3. A reasonable time to comply, depending on the circumstances.
- D. Civil Penalty. A person who fails to comply with the requirements of this chapter, who fails to conform to an approval or order issued, who undertakes new development without first obtaining approval, or who fails to comply with a stop work issued under these regulations shall be subject to a civil penalty levied in accordance with the provisions of Chapter 20.110 ECDC, provided, however, that the appeal process shall commence with a notice of violation as provided in ECDC 20.110.040(B).
- 1. Civil penalties for code violations shall be imposed in accordance with the provisions of Chapter 20.110 ECDC, provided, however, that in addition to the penalties set forth in that chapter, the hearing examiner is authorized to levy a penalty of up to Twenty Thousand Dollars (\$20,000) per occurrence based upon an assessment of the following factors. Where such factors are present, the hearing examiner is authorized to levy such penalty after taking into consideration the full impact of the violation and any mitigating circumstances (see 2 below):
- a. The violation created a risk to public health and the significance of the risk.
- b. The violation damaged the environment and the significance of the damage.
- c. The violation caused damage to public and private property and the significance of such damage.
  - d. A history of similar violations, if any.
- e. The economic benefit of the violations, if any, to the person or entity responsible for the violations.

- 2. Mitigating circumstances which may be used to offset or reduce the time resulting from the application of the preceding factors are limited to:
- a. Full compliance with a Voluntary Compliance Agreement and no history of similar violations.
- b. Full compliance with a Voluntary Compliance Agreement and a history of one or two similar violations (lesser reduction).
- c. A "Voluntary Compliance Agreement" is defined as a legally binding agreement entered into between the City and the alleged violators, by which the violator(s) acknowledge the existence of the violation, waive all appeal rights, and agree to and does pay a fine in an amount stipulated to between the violator and the City.
- 3. If the violation(s) are not corrected as ordered, or a Voluntary Compliance Agreement is not entered into within that time period and no appeal is filed for the next 15-day period shall be 150 percent of the initial penalties, and the penalties for the next 15-day period shall be 200 percent of the initial penalties. The intent of this subsection is to increase penalties beyond the maximum penalties stated as an additional means to achieve timely compliance.
- 4. Unless otherwise provided in a Voluntary Compliance Agreement, civil penalties shall be paid within 30 days of service of the notice and order or stop work order if not appealed. Payment of the civil penalties assessed under this chapter does not relieve a person found to be responsible for a code violation of his or her duty to correct the violation or to pay any and all civil penalties or other cost assessments issued pursuant to this chapter.
- 5. The city may suspend immediate payment of civil penalties if the person responsible for a code violation has entered into a Voluntary Compliance Agreement. Penalties shall begin to accrue again pursuant to the terms of the Voluntary Compliance Agreement if any necessary permits applied for are denied, canceled or not pursued, if corrective action identified in the voluntary compliance agreement is not completed as specified, or if the property is allowed to return to a condition similar to that condition which gave rise to the Voluntary Compliance Agreement, provided, however, that additional penalties shall not be imposed until additional notice and opportunity for hearing have been provided in accordance with Chapter 20.110 ECDC.
- 6. Civil penalties assessed create a joint and several personal obligations in all persons responsible for a code violation.

E. The determination of the hearing examiner issued in accordance with Chapter 20.110 ECDC shall be appealable to the Snohomish County Superior Court in accordance with the provisions of Chapter 36.70C RCW.

provisions of Chapter 36.70C RCw.

F. The remedies provided for in this section shall not be exclusive. The city may also use other civil and administrative remedies available to it, including but not limited to, the remedies provided in ECDC Title 19 and the State Building and Dangerous Publisher Code.

Building Code.

Section 2. The amendments set forth in Section 1 shall be effective June 1, 2010, provided, however, that the existing Chapter 18.30 shall remain in full force and effect with respect to any permit application filed prior to June 1st and which is vested in accordance with Washington state law and which under Washington law must continue to be processed in accordance with the provisions of the existing Chapter.

Section 3. Effective Date. This ordinance, being an exercise of a power specifically delegated to the City legislative body, is not subject to referendum, and shall take effect five (5) days after passage and publication of an approved summary thereof consisting of the title.

APPROVED:

MAYOR GARY HAAKENSON

ATTEST/AUTHENTICATED:

CITY CLERK, SANDRA S. CHASE

APPROVED AS TO FORM:

OFFICE OF THE CITY ATTORNEY:

BY

W. SCOTT SNYDER

FILED WITH THE CITY CLERK: 04-16-2010
PASSED BY THE CITY COUNCIL: 04-20-2010
PUBLISHED: 04-26-2010
EFFECTIVE DATE: 05-01-2010

#### **SUMMARY OF ORDINANCE NO. 3792**

of the City of Edmonds, Washington

On the 20th day of April, 2010, the City Council of the City of Edmonds, passed Ordinance No. 3792. A summary of the content of said ordinance, consisting of the title, provides as follows:

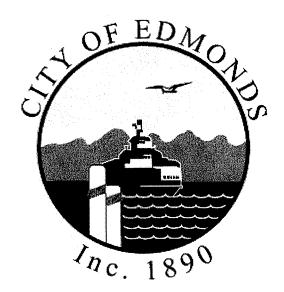
AN ORDINANCE OF THE CITY OF EDMONDS, WASHINGTON, REPEALING AND REENACTING CHAPTER 18.30 <u>STORM WATER MANAGEMENT</u> OF THE EDMONDS COMMUNITY DEVELOPMENT CODE, PROVIDING FOR THE APPLICATION OF EXISTING CHAPTER 18.30 TO VESTED PERMITS, AND FIXING A TIME WHEN THE SAME SHALL BECOME EFFECTIVE.

The full text of this Ordinance will be mailed upon request.

DATED this 21st day of April, 2010.

Sandra S. Chace CITY CLERK, SANDRA S. CHASE

# EXHIBIT A STORMWATER CODE SUPPLEMENT TO EDMONDS COMMUNITY DEVELOPMENT CODE CHAPTER 18.30



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## 1.0 Introduction

This Stormwater Code Supplement (Supplement) provides direction for implementing the City of Edmonds Community Development Code (ECDC) Chapter 18.30, Stormwater Management. Review ECDC Chapter 18.30.030 to determine if the City's Stormwater Management code and this Supplement apply to your project.

The contents of this Supplement come from several primary sources, including:

- Stormwater Management Manual for Western Washington (Ecology 2005) (Stormwater Manual) and manuals deemed equivalent to it by the Washington State Department of Ecology (Ecology).
- Western Washington Phase II Municipal Stormwater Permit (Ecology 2009) (Phase II Permit). See Appendix A for more information.
- Low Impact Development, Technical Guidance Manual for Puget Sound (Puget Sound Action Team and WSU Pierce County Extension 2005) (LID Manual).
- Basis for Updated Stormwater Management Standards for New Development and Redevelopment Projects in Edmonds (Herrera Environmental Consultants 2009).

Where this Supplement conflicts with the Stormwater Manual, this Supplement shall apply. Where provisions of this Supplement conflict with other City of Edmonds Code requirements or state and federal requirements, the document with the more stringent provisions will apply.

The rest of this Supplement is organized as follows:

- Chapter 2 Project Classifications: How to determine the stormwater requirements that apply to your site.
- Chapter 3 Low Impact Development (LID): Introduction to LID stormwater management practices and where they are found in this Supplement
- Chapter 4 Large Site Requirements: Direction on the applicable minimum requirements and best management practice (BMP) selection and design criteria for Large Site Projects, including low impact development (LID) techniques and specific runoff treatment and flow control measures.
- Chapter 5 Small Site Requirements: Direction on the applicable minimum requirements, and BMP selection/design criteria for Category 1 and Category 2 Small Site Projects, including the use of LID techniques and specific runoff treatment and flow control measures.
- Chapter 6 Minor Site Requirements: Direction on the applicable minimum requirements and BMP selection/design criteria for Minor Site Projects
- Chapter 7 Operations and Maintenance: Operations and maintenance (O&M) direction for the BMPs referenced in this Supplement.

- Chapter 8 Terminology: Definitions of key terms used in this Supplement.
- Chapter 9 References.

The Appendices provide additional background information on stormwater management in the City.

- Appendix A summarizes provisions of the Western Washington Phase II Municipal Stormwater Permit (Phase II Permit) that affect City stormwater management requirements.
- Appendix B provides a map of Edmonds' watersheds, areas with steep slopes, and soils information.
- Appendix C describes the two approved methods for obtaining design infiltration rates.

Throughout the remainder of this document, words in the definitions section of ECDC Chapter 18.30 and in Chapter 8 of this Supplement are in *bold italics* when first used.

## 2.0 Classifying Projects

This chapter helps you classify a project per ECDC Chapter 18.30.050. It also helps you classify impervious surfaces as existing, new, or replaced, which is necessary for determining which minimum requirements apply to a project.

Terms in **bold italics** are defined in the Terminology section of this document or in ECDC Chapter 18.30.

#### 2.1 **Project Classifications**

New development, redevelopment, and construction projects are classified as Large Site Projects (see Chapter 4), Small Site Projects (see Chapter 5), or Minor Site Projects (see Chapter 6). Small Site Projects are further divided into Category 1 and Category 2. See Figure 2-1 (located at the end of this chapter) and the text below to determine the classification (and the category, if a Small Site Project) of your project. The classification is largely based on the extent to which a project has the following:

- Land-disturbing activity (including clearing, grading, and excavating)
- New impervious surface and replaced impervious surface area Figure 2-2 and Section 2.2 provide direction on determining whether any or all of the *impervious* surface area on a site is considered new impervious area. Section 2.3 provides direction on determining the extent of replaced impervious surface area (if any).
- Conversion of *native vegetation* to lawn or landscaped area.

#### 2.2 **Determining New Impervious Surface Area**

Determining a project's classification and applicable minimum requirements is based in part on the area of new impervious surface generated. "New impervious surfaces" are those impervious surfaces (currently pervious) that are proposed for the project, but also include existing impervious surface on the site if the following condition applies: the existing impervious surface was created after July 6, 1977 (the effective date of the City's first drainage control ordinance) without stormwater controls (with noted exceptions).

Figure 2-2 presents a process for determining what portions of a project site are considered to be new impervious surface for the purposes of stormwater management.

#### **Determining Replaced Impervious Surface Area** 2.3

Determining a project's classification and applicable minimum requirements is based in part on the area of replaced impervious surface. "Replaced impervious surfaces" are exterior impervious surfaces proposed for the project where existing surfaces are also impervious. More specifically, "replaced impervious surface" means:

"For structures, the removal and replacement of any exterior impervious surfaces or foundation. For other impervious surfaces, the removal down to bare soil or base course and replacement. For sites with existing single family dwelling units, (as defined in Chapter 21.90.080 ECDC) a project that solely replaces impervious surfaces in-kind (footprint and imperviousness of material does not change, but not a structural foundation), shall not be considered replaced impervious surface for the purposes of this chapter, unless the project site has 1 acre or greater of land-disturbing activities."

Therefore, in-kind replacement of exterior impervious surfaces alone for Small Site Projects and Minor Site Projects (that are not part of a larger scale site redevelopment) are not considered to be replaced impervious surfaces. In these cases, the impervious surfaces are classified as existing impervious surfaces. These existing surfaces, however, may meet the definition of "new impervious surface" if they were constructed after July 6, 1977, as described in Section 2.2.

#### 2.3 **Determining Project Basin Type**

Projects are also classified by the drainage basin type: "Creek or Lake Basin" or "Direct Discharge Basin" sites. These categories are defined below.

- 1. Creek or Lake Basin sites: Those that eventually discharge into a surface water body such as a creek, wetland or pond, prior to discharging into Puget Sound; or that discharge into a storm drain or surface water body such as a creek prior to discharging into Lake Ballinger.
- 2. Direct Discharge Basin sites: Those that discharge runoff directly to Puget Sound via a pipe system, ditch, or other direct means without first entering a creek or other water body. Sites located in Direct Discharge Basins may have a different standard for flow control or may be exempt from flow control (See Sections 4.7 and 5.7).

A map of watersheds in Edmonds is presented as Figure B-1 in Appendix B to this Supplement. Direct Discharge Basins are those labeled "Puget Sound," Puget Sound Piped," and "Edmonds Way." All other basins are considered as Creek or Lake Basins. Approximately 83 percent of the land area of the City is within a Creek or Lake Basin. An applicant with site-specific information that is contrary to the basin designations shown in Figure B-1 can present this information to the Public Works Director or designee for a possible change in basin designation. The Public Works Director or designee will make a determination on any requests for a site-specific change in basin designation.

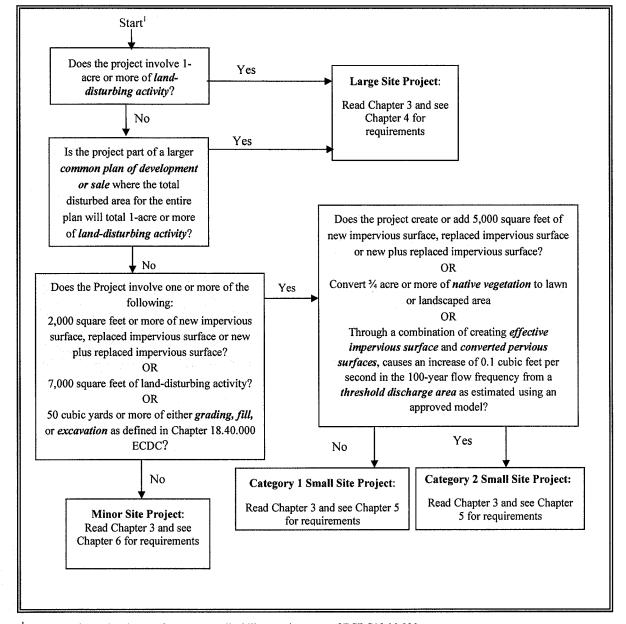


Figure 2-1: Project Classification

<sup>&</sup>lt;sup>1</sup> Assumes the project in question meets applicability requirements of ECDC18.30.030.

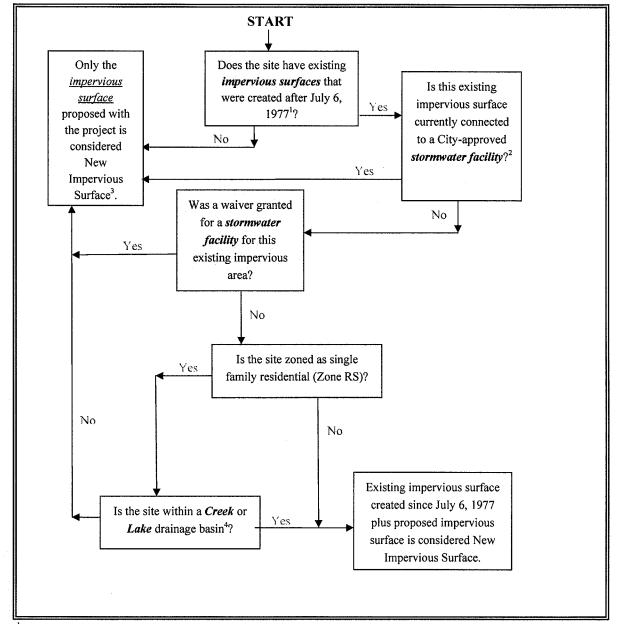


Figure 2-2: Determining What Qualifies as "New Impervious Surface" for a Project

This is the effective date of the City's first drainage control ordinance. The intent of this cumulative impacts mitigation requirement is to adequately mitigate for impervious surfaces on project sites that are submitted under separate permits. The separate submittals could have project areas that do not meet thresholds, but would meet thresholds if the projects are combined as one project.

For parcels that were annexed to the City after this date, the date of annexation shall substitute for the effective date of the City's first drainage control ordinance. For annexed parcels, a functioning Snohomish County-approved stormwater management facility can substitute for a City-approved facility.

- <sup>2</sup> For the purpose of this flowchart, it is assumed that all existing impervious surface will remain after the proposed project is complete. If any existing impervious surface will be demolished for this project, the project may contain a combination of new and replaced impervious surface. Consult the City's Engineering Division for direction.
- If there is an existing stormwater management system on site, contact the City's Engineering Division to discuss whether the existing system has the capacity for the new impervious surface area.
- See Figure B-1 and Section 2.3.

# 3.0 Low Impact Development

**Low impact development** (LID) is a relatively new approach to stormwater management. Formulation of LID principles began in Prince George's County, Maryland in the late-1980s to address the growing economic and environmental limitations of conventional stormwater management practices. For the purposes of this document, LID is defined as:

"Stormwater management and land development strategies applied at the parcel and subdivision scale that emphasizes the conservation and use of onsite natural features integrated with engineered, small scale hydrologic controls to more closely mimic the predevelopment hydrologic functions" (PSAT and WSU, 2005).

The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source in small, decentralized facilities. Instead of managing and treating stormwater in large, costly, end-of-pipe facilities at the bottom of drainage areas, LID seeks to manage stormwater using small, cost-effective landscape features at the lot level. Well-designed and appropriately sited LID measures can also improve the habitat and aesthetics of a developed site.

# 3.1 LID and this Stormwater Supplement

This Supplement allows the use of LID techniques or BMPs on *Large Site Projects*, when feasible and as required by the Phase II Permit. The Permit requires that the City identify and summarize barriers to the use of LID techniques. To accomplish this, the Supplement requires that *Large Site Projects* consider the use of LID techniques and document the decision-making processes used to select their application. More information on this requirement can be found in Sections 4.5 and 4.7. While small sites are not required to consider or use LID techniques, the use of LID is allowed by the City, where feasible.

LID BMPs are found throughout this Supplement. These BMPs emphasize minimizing the volume and rate of stormwater runoff from a site both during and after construction. Use caution when using some LID BMPs: site conditions, such as the presence of "hardpan" or till soils, steep slopes, and proximity of adjacent proprieties may preclude the use of LID BMPs due the possibility of causing flooding or erosion impacts to nearby properties.

Minimizing the stormwater runoff that leaves the site during the construction phase of a project is discussed in Minimum Requirement #2 (Construction Stormwater Pollution Prevention Plan) for Large, Small, and *Minor Site Projects* (Sections 4.2, 5.2, or 6.1). Minimizing stormwater runoff that leaves a site after construction with a permanent stormwater control plan is accomplished in two main ways, in the following order:

1. **Minimize the amount of rainwater that becomes stormwater runoff** through site design practices that use LID planning methods, including those that minimize

impervious surface area using Minimum Requirement #1, Stormwater Site Plan (Sections 4.1 or 5.1).

2. Minimize or eliminate runoff going off site with LID techniques, if site conditions allow by implenting Minimum Requirement #5, Onsite Stormwater Management (Sections 4.5 or 5.5).

LID methods that are allowed and encouraged in Edmonds include:

- Retaining or restoring native forest cover, other trees, and site vegetation to capture, infiltrate, and evaporate all or part of the precipitation falling on the site.
- Developing a site with the smallest impervious footprint possible and minimize landdisturbing activities such as clearing and grading.
- Preserving or restoring the health and water-holding capacity of the soils by compostamending.

Other LID methods that are allowed but that should only be implemented if site conditions allow are:

- Designing with runoff reduction methods such as vegetated roofs, rainwater harvesting and permeable pavement.
- · Managing stormwater runoff using infiltration, bioretention, and dispersion to the extent practicable.

Once these LID practices have been explored for applicability, stormwater runoff that cannot be managed onsite and flows offsite must meet applicable flow control and water quality requirements: Minimum Requirement #6, Runoff treatment and Minimum Requirement #7, Flow Control (Sections 4.6 and 4.7 or 5.6 and 5.7).

# 4.0 Large Site Requirements

This chapter explains how to comply with the Large Site Project minimum requirements (ECDC Chapter 18.30.060A-D1). For all large sites, the Thresholds, Definitions, Minimum Requirements and Exceptions, Adjustment and Variance Criteria found in Appendix I of the NPDES Phase II Municipal Stormwater Permit are applicable per Chapter 18.30 ECDC, as well as the mandatory incorporated provisions of the Stormwater Manual.

Figures 4-1 and 4-2 (located at the end of this chapter) will help you determine whether a Large Site **Project** is considered **new development** or **redevelopment**, which minimum requirements apply, and to which site surfaces (new impervious, replaced impervious, land disturbed, and/or converted pervious) the requirements apply. The minimum requirements for Large Site Projects are described below. Appendix B contains supplemental technical information on watershed boundaries and the location of steep slopes and soil types to assist with a stormwater site plan.

## Minimum Requirement #1 – Preparation of Stormwater Site Plan

Stormwater Site Plans shall be prepared for all Large Site Projects in accordance with Volume 1, Chapter 3 of the Stormwater Manual. The Stormwater Site Plan will document compliance with all applicable minimum requirements and the design of all best management practices (BMPs). For all Large Site Projects that involve 5,000 square feet or more of new or replaced impervious surface, stormwater best management practices must be designed by a civil engineer. See handouts prepared by the City's Engineering Division for specific submittal requirements.

The Stormwater Site Plan shall include the submittal requirements in the handout, reflect consideration of site planning and design measures intended to reduce project impact on stormwater quality and quantity, and must consider the use of LID approaches.

The use of LID should also include approaches that minimize the effective impervious surface area (area directly connected to the City's drainage system or surface waters) therefore reducing the amount of impervious surface area that requires mitigation using stormwater management BMPs. By reducing the amount of stormwater runoff generated, LID site planning and design techniques can also be used to satisfy the flow control requirements of Minimum Requirement #7. See Section 4.7.2 for criteria. Simplified design tools are available to encourage the use of LID and allow easy evaluation of LID flow control benefits (see Section 4.7.3.2).

Table 4-1 summarizes some potential LID site planning measures.

Large Site Minimum Requirement #5 (Section 4.5) discusses LID techniques for managing stormwater runoff on site to reduce or eliminate the amount of runoff that flows offsite to receiving waters.

BMP#	Stormwater Management Technique	Reference(s)/Design Guidance
T5.21	Better Site Design (e.g., ,Reduce Effective Impervious Areas Associated with Roads, Shared Accesses, Alleys, Sidewalks, Driveways, and Parking Areas)	Volume V Stormwater Manual; Chapter 3 LID Manual
T5.20	Native Vegetation Protection, Reforestation, and Maintenance	Volume V Stormwater Manual; Chapter 4 LID Manual
	Minimize disturbance area	Volume V Stormwater Manual; Section 5 LID Manual
-	Vegetated Roofs	City Building Division
	Rainwater Harvesting	LID Manual/City Building Divison
	Permeable Pavement (asphalt, concrete, paving blocks, "grass-crete")	Section 6.3 LID Manual or Volume 3 Seattle Manual 2009 (base course requirements)

**Table 4-1:** Site Planning and Design Techniques to Reduce the Amount of Stormwater Runoff Generated

Stormwater Manual = Stormwater Management Manual for Western Washington (Ecology 2005)

LID Manual = Low Impact Development: Technical Guidance Manual for Puget Sound.

Volume 3 Seattle Manual = Stormwater Flow Control & Water Quality Treatment Technical Requirements Manual.

### 4.2 Minimum Requirement #2 – Construction Stormwater Pollution **Prevention Plan**

All new development and redevelopment projects are responsible for preventing *erosion* and discharge of sediment and other pollutants into receiving waters during construction. See Section 4.2, Appendix 1 of the Phase II Permit and Volume II of the Stormwater Manual for a complete description of minimum requirement and direction on BMP selection and design. Compliance with this minimum requirement may be achieved for an individual site if the site is covered under Ecology's General NPDES Permit for Stormwater Discharges Associated with Construction Activities, if the provisions of such permit are fully implemented, and such a permit is approved by the Public Works Director or designee. The City does not approve erosivity waivers, as described in Section 4.2, Appendix 1 of the Phase II Permit.

### 4.3 Minimum Requirement #3 – Source Control of Pollution

All known, available, and reasonable source control BMPs shall be applied to control pollution. Source control BMPs shall be selected, designed, and maintained according to the Stormwater Manual. See Volume IV of the Stormwater Manual for guidance on the applicable source control BMP selection and implementation.

Specific source controls are not required for single family residential sites. General requirements for these sites include preventing the discharge of pollutants to the City's storm drainage system per Edmonds City Code Chapter 7.200 (Illicit Discharges). This includes common household items such as pesticides, herbicides, fertilizers, detergents and fluids from vehicle maintenance.

## 4.4 Minimum Requirement #4 – Preservation of Natural Drainage **Systems and Outfalls**

Natural drainage patterns shall be maintained. Run-on (from a potential upstream site) and runoff discharges from the project site shall occur at the location of the *natural drainage system and outfall*, to the maximum extent practicable. In most cases, the "natural location" is the existing discharge location on the site. For some redevelopment projects, the natural location for runoff discharge may have been previously altered. Contact City Engineering staff with questions about the natural discharge location.

The manner by which runoff is discharged from the project site must not cause an adverse impact to downstream receiving waters and downgradient properties. All outfalls to creeks, ditches, or other open channels require energy dissipation to prevent erosion. Minimum Requirement #10 describes offsite analysis that is required to identify potential downstream concerns so that adverse impacts are avoided through appropriate onsite design.

See Section 2.5.4 of Volume I of the Stormwater Manual for guidance on complying with this minimum requirement. The supplemental requirement in 2.5.4 of Volume I of the Stormwater Manual apply to Large Site Projects.

#### 4.5 Minimum Requirement #5 – Onsite Stormwater Management

Onsite stormwater management BMPs described in this section are considered LID techniques. These LID BMPs must be used to infiltrate, disperse, and retain stormwater runoff on site to the maximum extent feasible without causing flooding or erosion impacts, in accordance with Section 4.5, Appendix 1 of the Phase II Permit. These onsite/LID BMPs can be used for flow control and/or runoff treatment to reduce the size of, or eliminate the need for, additional facilities designed for Minimum Requirements #6 and #7, if applicable. All Large Site Projects are required to consider the use of LID practices and document the decision-making processes used to select or screen out their application.

As described in Minimum Requirement #1, the use of LID should begin in the site planning stage to minimize the amount of stormwater released from the site. Once site planning and design is complete and the generation of offsite runoff is minimized, stormwater runoff from the planned impervious surface and converted pervious surface areas must be mitigated.

All sites are required to implement:

- Roof downspout control BMPs, (either infiltration or dispersion) functionally equivalent to those described in Chapter 3 of Volume III of the Stormwater Manual to reduce the hydrologic disruption of the developed site to the maximum extent feasible without causing flooding or erosion impacts.
- The soil quality and depth BMP T5.13 for compost-amending, in Chapter 5 of Volume V of the Stormwater Manual for all disturbed pervious surface areas.

For some Large Site Projects, reducing the amount of stormwater runoff generated using LID planning techniques (Section 4.1) and using LID BMPs can satisfy the flow control requirements of Minimum Requirement #7 as well as Minimum Requirement #5. See Section 4.7.2 for criteria. Simplified design tools are available to encourage the use of LID and allow easy evaluation of LID flow control benefits (see Section 4.7.3.2).

#### **BMP Selection** 4.5.1

Common onsite/LID practices include but are not limited to:

- Bioretention cells (also known as rain gardens).
- Small-scale "traditional" infiltration facilities (such as dry wells, gravelless chambers, and trenches).
- Permeable pavement (asphalt, concrete, paving blocks, "grass-crete").
- Dispersion BMPs such as wheel strip driveways or other pavement sloped to drain to onsite vegetation adequate for dispersion, or downspout or sheet flow dispersion.

Onsite/LID BMP design requirements shall be those in the LID Manual or the Washington State Department of Transportation's Highway Runoff Manual (HRM). BMP design requirements presented in other stormwater management manuals or standard documents approved by Ecology such as the City of Seattle and King County stormwater manuals are also acceptable when modified for local conditions such as precipitation and soil conditions. Table 4-2 presents a summary of onsite/LID measures that could be used to manage stormwater on site, along with references for design guidance information. Additional LID BMPs can be proposed as long as they are found in an Ecology-approved stormwater manual, are appropriate for site conditions, and do not cause on- or offsite flooding or erosion impacts.

LID techniques that rely on infiltration should be designed with caution, due to the prevalence of till or "hardpan" soil and steep slopes in Edmonds. Section 4.5.2 discusses this matter further.

See Section 5.5.3 for a discussion of installing rain gardens on single-family residential sites without the services of a geotechnical professional to assess soil infiltration rates.

## 4.5.2 Onsite/LID Techniques and Infiltration

Onsite/LID features that rely on infiltration (such as bioretention) are not appropriate for every site. Limitations and considerations include:

- Infiltration is prohibited in the Earth Subsidence and Landslide Hazard Area (ESLHA) (ECDC Chapter 19.10), upgradient of the ESLHA, and other areas with geological instability (landslide hazard areas). See Figure B-3 in Appendix B.
- Infiltration is prohibited in "steep slope areas" with average ground surface slopes equal to or greater than 15 percent. See Figure B-3 in Appendix B.

- Infiltration is prohibited within setbacks from the top of a designated landslide hazard or steep slope areas.
- Infiltration should be applied in areas that have higher infiltration rates (especially in areas with soils classified as Everett gravelly sandy loam).

When not restricted as noted above, infiltration should be used as much as possible in the Greater Lake Ballinger Watershed and in all other creek basins.

Table 4-2: **Commonly Used Onsite/LID Stormwater Management Techniques** 

BMP#	Onsite Stormwater Management Technique	Reference(s)/Design Guidance
	Infiltration	BMPs
	Bioretention Facilities (Rain gardens)	Section 6.1 LID Manual and City Pre-Sizing Tables
	Infiltration Trench (downspout or other)	City Pre-Sizing Tables
	Drywell	City Pre-Sizing Tables
	Gravelless Chamber	City Pre-Sizing Tables
T5.13	Preserve and Restore Soil Quality and Depth	Volume V Stormwater Manual; "Soils for Salmon" website, Section 6.1 LID Manual
Dispersion BMPs		BMPs
C.2.9.3	Wheel Strip Driveway	King County Manual. Appendix C.
T5.10, T5.11 & T5.12	Downspout or Sheet Flow Dispersion Systems	Volume V Stormwater Manual, City Pre-Sizing Tables
T5.30	Full Dispersion	Volume V Stormwater Manual

LID Manual = Low Impact Development: Technical Guidance Manual for Puget Sound.

City Pre-Sizing Tables are available from the City's Engineering Division

Stormwater Manual = Stormwater Management Manual for Western Washington.

King County Manual = 2009 King County Surface Water Design Manual.

Soils reports are required where infiltration is proposed; soil reports for individual lots must include at least two soil logs for each proposed infiltration location. Each log shall correspond to soil conditions extending a minimum of 4 feet depth below ground surface (6 feet for drywells). The report shall describe the Soil Conservation Service (SCS, now called the Natural Resource Conservation Service or NRCS) series of the soil and the textural class of each horizon through the depth of the log, and shall note any evidence of a high groundwater table, such as mottling. Reports solely using the Unified Soil Classification System (USCS) will not be accepted. Soils reports must be prepared by or under the direction of a licensed onsite sewage system designer, civil engineer, engineering geologist, or geotechnical engineer.

A soils report produced for siting and design of an onsite sewage system may also be used to satisfy this soils report requirement, provided that (a) the depth of the soil log(s) is at least 4 feet, (b) the depth to seasonal high water table is determined, and (c) the location of the soil logs is adequate to determine the feasibility of the infiltration system.

Field infiltration rates can be evaluated using one of two approved methods: USDA Textural Classification, or the Modified Pilot Infiltration Testing (PIT) Method. These methods are described in Appendix C to this Supplement.

A correction factor shall be applied to the measured infiltration rate to convert to the design infiltration rate. This correction factor shall be different based on the time of year of the test. If the test is conducted from May 1 through October 31, the correction factor shall be two times the correction factor listed in Table C-1 (USDA method) or Table C-2 (modified PIT method) in Appendix C of this Supplement. For infiltration rates tested from November 1 – April 30, the correction factor shall be equal to the correction factor listed in Table C-1 (USDA method) or Table C-2 (modified PIT method) in Appendix C of this Supplement.

In certain situations, BMPs that rely on infiltration are classified as Underground Injection Controls (UICs) and may be regulated by Ecology under the UIC Program (Washington Administrative Code [WAC] 173 218). For more information on Underground Injection Control (UIC) see the 2006 Ecology document titled Guidance for UIC Wells that Manage Stormwater. This document is available online at <a href="http://www.ecy.wa.gov/biblio/0510067.html">http://www.ecy.wa.gov/biblio/0510067.html</a>>.

#### 4.6 Minimum Requirement #6 – Runoff Treatment

Runoff treatment BMPs must handle the water quality design storm volume or flow rate using the appropriate treatment type (basic, enhanced, oil control, or phosphorus treatment) for all new and replaced project pollution-generating surfaces. BMPs to meet this minimum requirement must be designed by a civil engineer.

## 4.6.1 Project Thresholds

Stormwater treatment facilities are required for the following:

- Projects in which the total of new and replaced effective, pollution-generating impervious surface (PGIS) is 5,000 square feet or more in a threshold discharge area of the project.
- Projects in which the total of pollution-generating pervious surfaces (PGPS) is threequarters (3/4) of an acre or more in a threshold discharge area, and from which there is a surface discharge from the site into a natural or man-made conveyance system.

That portion of any development project in which the PGIS or PGPS thresholds listed above is not exceeded in a threshold discharge area shall apply onsite stormwater management BMPs in accordance with Minimum Requirement #5 to the maximum extent practicable.

## 4.6.2 Runoff Treatment Standards

Runoff treatment standards shall be implemented per Section 4.6, Appendix 1 of the Phase II Permit. In addition, the following Edmonds-specific requirements apply.

## 4.6.2.1 Oil Control

All projects in areas not zoned as single family residential that collect runoff from 5 or more parking spaces shall install oil containment catch basins if another approved oil control system is not employed. The outlet pipe of these catch basins shall have a downturned 90 degree elbow to restrict the outflow of oil and other floatables. There should be at least 9 inches of clearance between the elbow and the inside wall of the catch basin to facilitate removal of floatables. A maintenance schedule for the removal of oil and other floatables from these catch basins must be submitted with all plans for review.

## 4.6.2.2 Phosphorus Treatment

Per Section 4.6.2, Appendix 1 of the Phase II Permit, phosphorus treatment is required for projects that discharge to a nutrient-critical receiving water. Currently this requirement applies to projects in the Greater Lake Ballinger Watershed (see Appendix B) that has a Total Maximum Daily Load (TMDL) for phosphorus. Bioretention systems with overflows (i.e., systems not providing 100 percent infiltration) should not be used in this basin due to potential phosphorus export in the treated runoff discharged ultimately to the lake.

## 4.6.3 Runoff Treatment BMP Selection

A sampling of runoff treatment BMPs is summarized in Table 4-3, with the treatment levels and design criteria references. Additional BMPs may be approved by the City's Engineering Division on a case-bycase basis. BMPs shall be selected from the list according to the treatment type required, and according to the following general prioritization guidelines:

- Bioretention systems should be implemented where feasible in creek basins. If infiltration of runoff is not feasible at the site, consider use of bioretention systems with underdrains.
- Onsite Stormwater Management Measures (see Section 4.5 above) are preferred, if feasible, over larger runoff treatment facilities. Be sure that these onsite techniques are being applied to the maximum extent practicable before selecting runoff treatment BMPs.

**Table 4-3: Runoff Treatment Best Management Practices** 

		Treatment Type				
BMP#	Runoff Treatment BMP	Basic Treatment	Enhanced Treatment	Phosphorus Treatment	Oil Control	Reference(s)/Design Guidance
-	Bioretention Facilities	X	X			Section 3.1 LID
	(Rain Gardens)		**************************************			Manual
T7.10	Infiltration Basins	*	*	<b>.</b>		Volume III Stormwater Manual
T7.20	Infiltration Trenches	*				Volume III Stormwater Manual
T7.30	Bioinfiltration swale	*	*	*		Volume V Stormwater Manual
T9.10	Basic Biofiltration Swale	X				Volume V Stormwater Manual
T9.20	Wet Biofiltration Swale	X				Volume V Stormwater Manual
T9.30	Continuous Inflow Biofiltration Swale	X				Volume V Stormwater Manual
T9.40	Basic Filter Strip	X				Volume V Stormwater Manual
T9.50	Narrow area filter strip	X				Volume V Stormwater Manual
RT.02	Compost-Amended Vegetated Filter Strip	x	X		X	HRM
T10.10	Wetponds (basic)	X				Volume V Stormwater Manual
T10.10	Wetponds (large)	X	a Madaga a 1900 प्रदेश कर देव होता है । प्रदेश के प्रदेश के क्षेत्र प्रदेश के क्षेत्र के प्रदेश के विकास कर जि	X	ende vare est have est element of	Volume V Stormwater Manual
T10.20	Wet vaults	X				Volume V Stormwater Manual
T10.30	Stormwater treatment wetland	X	X	Service Control of the Control of th		Volume V Stormwater Manual
T10.40	Combined detention/wetpool facilities	X				Volume V Stormwater Manual
	Sand Filter Basin	X	*	*		Volume V Stormwater Manual
T8.10	Sand Filter Vault	X	*	*		Volume V Stormwater Manual
T8.20	Linear Sand Filter	X	*	*	X	Volume V Stormwater Manual
RT.07	Media Filter Drain	X	X	X		HRM
T11.10	API (Baffle type) Separator Bay				X	Volume V Stormwater Manual
T11.11	Coalescing Plate (CP) Separator Bay				X	Volume V Stormwater Manual
RT.22	Oil Control Booms		y a same a manange of the	and the second second second second	X	HRM

X = BMP meets this treatment type

<sup>\* =</sup> BMP can be designed to meet this treatment type

LID Manual = Low Impact Development: Technical Guidance Manual for Puget Sound

Stormwater Manual = Stormwater Management Manual for Western Washington

HRM = WSDOT Highway Runoff Manual

## 4.7 Minimum Requirement #7 – Flow Control

Flow control BMPs shall be implemented for all *effective impervious surface area* that *is new and replaced* and *converted pervious surfaces* per Section 4.7, Appendix 1 of the Phase II Permit to reduce the impacts of stormwater runoff from impervious surfaces and land cover conversions. BMPs to meet this minimum requirement must be designed by a *civil engineer*. Large Site Projects that fall below the Phase II Permit thresholds for flow control but have 2,000 square feet or more effective impervious surface must comply with the Edmonds-specific flow controls standard described in Section 4.7.2.

The use of LID techniques under Minimum Requirements #1 and #5 can satisfy this minimum requirement for some Large Site projects. Simplified design tools are available to encourage the use of LID and allow easy evaluation of LID flow control benefits (see Section 4.7.3.2).

## 4.7.1 Project Thresholds and Applicability

The applicability of this minimum requirement is dependent upon the drainage basin of the project site. See Chapter 2 for drainage basin classifications. If flow control is not required, onsite stormwater management techniques must still be applied to the maximum extent practicable (see Section 4.5).

## Creek or Lake Basin Projects

Large Site Projects in Creek or Lake Basins must meet Phase II Permit flow control standards if any of the following Phase II permit thresholds are met or exceeded:

- Projects in which the total new and replaced effective impervious surface in a threshold discharge area is greater than 10,000 square feet.
- The native vegetation area converted to lawn or landscaping is 3/4 acres or more, or the native vegetation area converted to pasture is 2.5 acres or more in a threshold discharge area and from which there is surface discharge in natural or man-made conveyance systems from the site.
- Where through a combination of effective impervious surface and converted pervious surfaces
  the project causes a 0.1 cubic feet per second or greater increase in the 100-year recurrence peak
  flow from a threshold discharge area as estimated by an Ecology-approved continuous simulation
  model.

## Direct Discharge Basin Projects

Large Site Projects in *Direct Discharge Basins* can be exempt from Small Site Minimum Requirement #7 under one of the following circumstances:

• A quantitative Offsite Analysis as described in Large Site Minimum Requirement #10 is performed by the applicant and no unacceptable downstream issues (such as a capacity or erosion issue), are found.

 A quantitative Offsite Analysis as described in Large Site Minimum Requirement #10 is performed by the applicant, and one or more unacceptable downstream issues are discovered. A plan is proposed by the applicant to mitigate for the unacceptable downstream issue and the mitigation plan is approved by the Public Works Director or designee.

Any Large Site Project in a Direct Discharge Basin can be exempt from Large Site Minimum Requirement # 10 by meeting the applicable flow controls standard for sites in Creek or Lake Basins (see Section 4.7.2).

## 4.7.2 Flow Control Standards

Flow control standards for Large Site Projects vary by basin type and the amount of effective impervious surface. These standards for projects that must meet Phase II permit requirements are summarized in Table 4-4, and for all other projects in Table 4-5 (Lake or Creek Basin) or Table 4-6 (Direct Discharge Basin).

**Table 4-4:** City of Edmonds flow control requirements for Large Site Projects Triggering Phase II Permit Requirements

	≥ 10,000 sf Effective Impervious Area <sup>a</sup>
Numerical Standard:	Match 1/2 the 2-year to 50-year flow durations to predeveloped forest condition
Applies to:	New and replaced impervious surface and disturbed pervious areas
Computational Methods:	Continuous hydrologic modeling with MGS precipitation data b, c
	Options to Meet Numerical Standard
LID Credit Option (If feasible):	Credit given for meeting the flow control standard using LID techniques described in the Stormwater Manual
Traditional Option:	If it is not feasible to achieve the standard using LID only, larger-scale infiltration or detention may be used as described in the Stormwater Manual

square feet

LID: low impact development

## Phase II Permit Flow Control Standard

Large Site Projects in Creek or Lake Basins that meet one or more of the Phase II permit thresholds listed above must meet the following flow control standard for all new and replaced impervious surface and converted pervious surface: match 1/2 the 2-year to 50-year recurrence flow durations to the predeveloped condition as determined using a continuous hydrologic model.

Or at least 3/4 acres conversion to lawn/landscape, at least 2.5 acres conversion to pasture, or a greater than 0.1 cubic feet per second increase in the 100-year flood frequency.

b MGS precipitation is the Puget East 36 precipitation time series developed for the Washington State Department of Transportation by MGS Engineering Consultants, Inc. and available in WWHM and MGS Flood hydrologic modeling software.

For infiltration facilities, flood frequency calculations (i.e., determination of recurrence interval peak flows) must be performed using an approach capable of properly evaluating zero flow years as explained in Section 4.7.3.1 below.

## **Edmonds-Specific Flow Control Standards**

Large Site Projects in Creek or Lake Basins or in Direct Discharge Basins that do not meet one or more of the Phase II permit thresholds must meet the City-specific flow control standards. Large Site Projects in Direct Discharge Basins can be exempt from these flow control standards if a quantitative off-site analysis indicates that the uncontrolled flows from the site will not cause a flooding, erosion, or other problem downstream (see Section 4.10).

Recurrence interval flows for the developed condition shall be determined using a continuous hydrologic model. For sites with 2,000 square feet or greater (and less than or equal to 5,000 square feet) of new plus replaced impervious surface area the post-development 10-year recurrence interval flow shall not exceed 0.25 cubic feet per second (cfs) per acre of impervious surface area for all flow control BMPs.

For sites with greater than 5,000 square feet of new plus replaced impervious surface area, limits for the post-development peak flows depend upon the BMP type selected:

## • For detention BMPs:

- Creek or Lake Basins: the post-development 2-, 10-, and 100-year recurrence interval peak flows shall not exceed 0.07, 0.14, and 0.33 cfs per acre of impervious surface area, respectively.
- Direct Discharge Basins: the post-development 10-, and 100-year recurrence interval peak flows shall not exceed, 0.25 and 0.45 cfs per acre of impervious surface area, respectively.

## • For infiltration BMPs:

- Creek or Lake Basins: the post-development 2-, 10-, and 100-year recurrence interval peak overflows shall not exceed 0.07, 0.25, and 0.45 cfs per acre impervious surface area, respectively.
- Direct Discharge Basins: the post-development 10-, and 100-year recurrence interval peak overflows shall not exceed 0.25, and 0.45 cfs per acre impervious surface area, respectively.

There are two methods to satisfy Minimum Requirement #7 for sites subject to the City-specific Standard: the "LID Credit Option" and the "Traditional Option". Large Site Projects shall use the LID Credit Option to implement flow control, if feasible. The LID Credit Option allows an applicant to mitigate only a portion of the new and replaced impervious surface area if only LID site planning techniques and LID BMPs are used. The requirements for the LID Credit Option are presented below.

- For projects that generate greater than 2,000 square feet (but less than or equal to 5,000 square feet) of new plus replaced effective impervious surface area, the greater of 1) 2,000 square feet or 2) 85 percent of new plus replaced impervious surface area is mitigated to meet the flow control standard using LID measures.
- For projects that generate greater than 5,000 square feet of new plus replaced effective impervious surface area, the greater of 1) 5,000 square feet or 2) 90 percent of new plus

replaced impervious surface area is mitigated to meet the flow control standard using LID measures.

If it is not feasible to use the LID Credit Option to meet Minimum Requirement #7, the project shall meet the flow control standard for all new and replaced impervious surface and converted pervious surface. In this case, the "Traditional Option", larger-scale infiltration BMPs or detention BMPs may be used to provide flow control for the areas not mitigated using LID measures.

City of Edmonds Flow Control Requirements for Large Site Projects Creek or Lake Basins<sup>a</sup> **Table 4-5:** 

EDMONDS STORWMATER CODE SUPPLEMENT

	≥2,000 sf Effective Impervious Area <sup>b</sup>	≥5,000 sf Effective Impervious Area
	Numerical Standard	p
Maximum Recurrence Interval Flow from Developed	10-year = 0.25 cfs/acre impervious	For detention BMPs:  2-year = 0.07 cfs/acre impervious,  10-year = 0.14 cfs/acre impervious, and  100-year = 0.33 cfs/acre impervious.
Site:		For infiltration BMPs:  2-year = 0.07 cfs/acre impervious, 10-year = 0.25 cfs/acre impervious, and 100-year= 0.45 cfs/acre impervious.
Applies to:	New and replaced effective impervious surface	New and replaced effective impervious surface
Computational Methods	Computational         Simplified Sizing Approach or continuous hydrologic modeling with           Methods         MGS precipitation data <sup>c,d</sup>	Simplified Sizing Approach or continuous hydrologic modeling with MGS precipitation data $^{\diamond d}$
	Options to Meet Numerical Standard	Standard
LID Credit Option (If Feasible)	If 2,000 sf or 85% of new plus replaced impervious surface area (whichever is greater) is mitigated to the numerical standard using Onsite/LID techniques (Minimum Requirement #5), the requirement is met.	If 5,000 sf or 90% of new plus replaced impervious surface area (whichever is greater) is mitigated to the numerical standard using Onsite/LID techniques (Minimum Requirement #5), the requirement is met.
Traditional Option	If not feasible to achieve standard with Onsite/LID option, numerical standard must be achieved for the entire site. Larger-scale infiltration or detention may be used – see Section 4.7.4.	If not feasible to achieve standard with Onsite/LID option, numerical standard must be achieved for the entire site. Larger-scale infiltration or detention may be used – see Section 4.7.4.

cfs: cubic feet per second

square feet

LID: low impact development

<sup>a</sup> Sites with less than 1-acre of land-disturbing activities

<sup>b</sup> But less than 5,000 sf of new plus replaced impervious area
 <sup>c</sup> MGS precipitation is the Puget East 36 precipitation time series developed for the Washington State Department of Transportation by MGS Engineering Consultants, Inc. and available in WWHM and MGS Flood hydrologic modeling software.

For infiltration facilities, flood frequency calculations (i.e., determination of recurrence interval peak flows) must be performed using an approach capable of properly evaluating zero flow years as explained in Section 4.7.3.1 below

Table 4-6: City of Edmonds Flow Control Requirements for All Other Large Site Projects **Direct Discharge Basins** 

	≥ 2,000 sf Effective Impervious Surface <sup>a</sup>
Numerical Standard:	For detention and infiltration BMPs:
Stanuaru:	10-year = 0.25 cfs/acre impervious, and 100-year= 0.45 cfs/acre impervious
	An exemption from these flow control standards may be allowed by the Public Works Director or designee if a quantitative offsite analysis per Large Site Minimum Requirement # 10 (see Section 4.10) indicates no unacceptable downstream issue (such as a capacity or erosion issue). If an unacceptable downstream issue is found, the applicant can either propose mitigation of the issue to the Public Works Director or designee (whom will consider the proposal but not necessarily approve it) or design and implement flow control measures to the Lake or Creek Basin Standard (see Section 4.7.1).
Applies to:	New and replaced effective impervious surface
Computational Methods	Simplified Sizing Approach or continuous hydrologic modeling with MGS precipitation data b, c
	Options to Meet Numerical Standard
LID Credit Option (If feasible)	For sites with 2,000 sf or more (but less than 5,000 sf) of effective impervious surface: If 2,000 sf or 85% of new plus replaced impervious surface area (whichever is greater) is mitigated to the numerical standard using Onsite/LID techniques (Minimum Requirement #5), the requirement is met.
	For sites with 5,000 sf or more of effective impervious surface: If 5,000 sf or 90% of new plus replaced impervious surface area (whichever is greater) is mitigated to the numerical standard using Onsite/LID techniques (Minimum Requirement #5), the requirement is met.
Traditional Option	If Onsite/LID techniques are not feasible, larger-scale infiltration or detention may be used to mitigate capacity impact to the extent necessary - See Section 4.7.4.

- sf: square feet
- But less than 10,000 square feet of effective impervious area.
- MGS precipitation is the Puget East 36 precipitation time series developed for the Washington State Department of Transportation by MGS Engineering Consultants, Inc. and available in WWHM and MGS Flood hydrologic modeling software.
- For infiltration facilities, flood frequency calculations (i.e., determination of recurrence interval peak flows) must be performed using an approach capable of properly evaluating zero flow years as explained in Section 4.7.3.1 below.

## 4.7.3 Flow Control Facility Sizing

All flow control facilities for Large Site Projects must be designed by a civil engineer.

## 4.7.3.1 Modeling Requirements

Flow control facilities must be sized to meet the standards described above using an approved continuous runoff simulation model. Guidance on application of continuous runoff models for flow control BMP sizing is provided in Volume III of the Stormwater Manual. Supplemental guidance is provided in this section.

Approved continuous runoff models include Western Washington Hydrologic Model (WWHM) and MGS-Flood. Flow control sizing must be conducted using the "Puget East 36" precipitation time series developed by MGS Engineering Consultants (MGS 2002). This time series is available in WWHM (labeled "DOT data"), and is one of the default precipitation time series in MGS-Flood.

In addition, for infiltration facilities, flow frequency calculations (i.e., determination of recurrence interval peak flows) must be performed using an approach capable of properly evaluating zero flow years. This is important because infiltration facilities sized to meet the recommended flow control standards will infiltrate approximately 98 percent of the runoff volume, resulting in an annual peak flow time series that contains several zero or very low peak flow values. Currently the MGS-Flood model properly calculates flood frequency for these scenarios, while WWHM does not. Until WWHM integrates a more flexible flow frequency routine, it is recommended that annual peak flow datasets with multiple low or zero annual peak flow values be exported from WWHM and analyzed using a spreadsheet method to determine flow frequency (i.e., 2-, 10-, and 100-year recurrence interval flows). The Gringorten plotting position formula (Maidment 1993), which is non-parametric (i.e., does not depend on the mean, standard deviation, or skew of the data), works well for these applications.

## 4.7.3.2 Simplified Sizing Approach

A pre-sized approach for sizing flow control BMPs has been developed for Large Site Projects in Edmonds with between 2,000 and 10,000 square feet of new and replaced impervious surface area. This approach allows the designer to size selected BMPs to meet the numerical flow control standards without the use of a continuous hydrologic model. Guidance for using the simplified sizing approach for flow control BMPs is provided in City of Edmonds Handouts available from the Engineering Division.

## 4.7.4 Flow Control BMP Selection

This section discusses infiltration and flow control BMPs. If onsite/LID is not used, flow control can be achieved using larger-scale infiltration or detention.

## 4.7.4.1 Larger-Scale Infiltration

If LID is not feasible, larger-scale, centralized infiltration facilities may be used (as opposed to the small and distributed infiltration facilities associated with LID). Infiltration is the preferred method of stormwater flow control relative to detention, but only in certain areas of Edmonds where infiltration of large amounts of runoff in a concentrated area will not contribute to flooding or offsite slope stability problems. The feasibility of infiltration as a means to meet stormwater flow control and treatment requirements will depend upon specific project site locations due to the variations in soil and topography across the City. See Chapter 4.5.2 for guidelines pertaining to the applicability and testing required for implementing infiltration for flow control.

Examples of infiltration BMPs for flow control are summarized in Table 4-7.

## 4.7.4.2 Detention

If infiltration BMPs are not feasible to meet flow control requirements for a site, detention BMPs can be used. The minimum orifice size for detention facility outlet control structures is one-half inch (1/2 inch).

Table 4-9 summarizes some available BMPs for flow control, including several detention options. The City's Building Division should be contacted prior to designing roof detention systems.

BMP# Flow Control BMP Reference(s)/Design Guidance **Larger-Scale Infiltration BMPs** T7.10 Infiltration Basins Volume III Stormwater Manual T7.20 Infiltration Trenches Volume III Stormwater Manual T7.30 Infiltration Vaults Volume III Stormwater Manual Gravelless Chambers Kitsap County Stormwater Management Design Manual (Kitsap County 1997) **Detention BMPs Detention Ponds** Volume III Stormwater Manual **Detention Tanks** Volume III Stormwater Manual **Detention Vaults** Volume III Stormwater Manual Volume III Stormwater Manual Use of Parking Lots for Detention Use of Roofs for Detention Volume III Stormwater Manual

Table 4-7: **Flow Control Best Management Practices** 

Stormwater Manual = Stormwater Management Manual for Western Washington.

#### 4.8 Minimum Requirement #8 – Wetland Protection

Volume I, Section 2.5.8 of the Stormwater Manual has guidance on meeting Minimum Requirement #8. Refer also to ECDC Chapter 23.40.

#### 4.9 Minimum Requirement #9 – Operation and Maintenance

BMPs shall be maintained in accordance with the provisions in Chapter 7 of this Supplement.

# 4.10 Minimum Requirement #10 – Offsite Analysis and Mitigation

Large Site Projects that discharge stormwater off site shall submit as part of their Stormwater Site Plan an offsite analysis that assesses the potential offsite impacts of stormwater discharge. Offsite analyses assess upstream and downstream conditions, including the conveyance capacity and erosion potential in the downstream system. If a problem is found, mitigation is required to prevent worsening of that problem.

The existing or potential impacts to be evaluated and mitigated as part of any off- site/downstream analysis shall include:

- Conveyance system capacity problems.
- Localized flooding.
- Wetlands impacts such as siltation or other damage.
- Upland erosion impacts, including landslide hazards.

- Stream channel erosion in the channel or at the outfall location.
- Locations where surface water enters and exits the site.

All projects shall perform a *qualitative* analysis downstream from the site. A *quantitative* analysis may also be required by the Director or his/her designee when there is a potential for downstream flooding or erosion. Each of these types of analysis is described further below.

## 4.10.1 Qualitative Analysis

Project applicants shall submit a qualitative analysis of each upstream drainage system entering a site (run-on) and each downstream drainage system leaving a site (runoff). The upstream analysis shall identify and describe points where water enters the site and the tributary area. The qualitative analysis shall extend downstream for the entire flow path, from the project site to the receiving water, or up to one-quarter mile, whichever is less. A map defining the onsite and offsite areas that contribute stormwater runoff to the site shall be provided by the applicant. The map shall be prepared with a defined scale.

Upon review of this analysis, the Public Works Director or Designee may require a qualitative analysis extending further downstream, mitigation measures deemed adequate to address the problems, or a quantitative analysis, depending upon the presence of existing or predicted flooding, erosion, or water quality problems, and on the proposed design of the onsite drainage facilities.

## 4.10.2 Quantitative Analysis

If required, a *civil engineer* or professional land surveyor must field survey all existing storm drainage systems downstream of the project site for a minimum distance of 1/4-mile from the point of connection to the existing public drainage system. If the ultimate discharge point is to Puget Sound via a culvert owned by BNSF Railway, the analysis must be followed through the drainage system all the way to Puget Sound. The goal of the inspection and analysis is to evaluate whether the capacity of the drainage system(s) is adequate to handle the existing flows, flows generated by the project, flooding problems, erosion damage or potential, amount of freeboard in channels and pipes, and storage potential within the system.

All existing and proposed offsite surface water conveyance systems shall be sized to convey flows without surcharging the City's storm system or the BNSF culvert under the railroad tracks (if applicable) during the 50-year recurrence event. If the project is in the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA, see Appendix B), contact the City Engineering Division for requirements.

If a capacity problem, streambank erosion problem, or other problem with the downstream system is encountered in the analysis, the runoff flow from the project site will be restricted per Minimum

Requirement #7 – Flow Control or other mitigation may be proposed by the applicant subject to review by the Public Works Director or Designee.

## Minimum Requirement #11 - Financial Liability

A performance bond shall be posted as a financial guarantee for required stormwater systems and BMPs related to Construction Stormwater Pollution Prevention Plans for the following Large Site Projects:

- Single family residential projects located within Critical Areas, Critical Area buffers including the ESLHA.
- Multi-family residential and commercial projects
- Subdivisions involving 7,000 square feet or more of land disturbing activity.

Start Does the site have 35% or See Redevelopment YES Minimum Requirements Flow Chart (Figure 4-2) more of existing impervious coverage NO Does the project add 5,000 square feet or more of new impervious surface? YES NO Does the project convert All Minimum Requirements 3/4 acres or more of native (#1-#11) apply to new AND replaced impervious vegetation to lawn or YES landscaped areas, or convert 2.5 acres or more surfaces AND converted of native vegetation to pervious surfaces. pasture? NO Does the project have 2,000 square feet or more YE\$ of new impervious surfaces? NO Minimum Requirements #1 Does the project have land-disturbing activities of 7 000 square feet or more? through #5 apply to new AND replaced impervious YES surfaces AND the land disturbed. NO Apply Minimum Requirement #2, Construction Stormwater Pollution Prevention

Figure 4-1: Flow Chart for Determining Minimum Requirements for New Development on Large Site Projects

From Figure 4-1 Does the area of new, replaced, or new plus replaced impervious surfaces total 2,000 square feet or more? OR Does the area of land-disturbing activity total 7,000 square feet or more? YES NO Minimum Requirements #1 through #5 apply to newAND replaced impervious surfaces AND the Apply Minimum Requirements #2, Construction Stormwater Pollution Prevention land disturbed. **Next Question** Does the project add 5,000 square feet or more of new impervious surfaces? OR Convert 3/4 acres or more of native vegetation to lawn or landscaped areas? OR Convert 2.5 acres or more of native vegetation to pasture? NO. Next All Minimum Requirements (#1-#11) apply to new Question Is this a road-related AND replaced impervious surfaces AND project? converted pervious surfaces. NO YES Does the project add 5,000 square feet or more to the existing impervious surfaces within the project limits? YES NO Is the total of new plus replaced impervious surfaces 5,000 square feet or more, AND does the does Do new impervious surfaces the value of the proposed improvements — including interior improvements — exceed 50% of the add 50% or more to the NO NO No additional existing impervious surfaces requirements within project limits? assessed value (or replacement value) or the existing site improvements? YES YES All Minimum Requirements (#1-#11) apply to new AND replaced impervious surfaces.

Figure 4-2: Flow Chart for Determining Minimum Requirements for Redevelopment on Large Site Projects

# 5.0 Small Site Requirements

This section provides specific guidance on how to comply with the minimum requirements for *Small Site Projects*. Appendix B contains supplemental technical information on watershed boundaries and the location of steep slopes and soil types.

The requirements applicable to Small Site Projects differ for Category 1 and Category 2 project types. For an explanation of how to classify a Small Site project, see Chapter 2.

Category 1 Small Site Projects are subject to the following Minimum Requirements for all *new and* replaced impervious surfaces, converted pervious surfaces, and disturbed pervious surface areas:

- Small Site Minimum Requirement #1 Preparation of Stormwater Site Plan (Section 5.1)
- Small Site Minimum Requirement #2 Construction Stormwater Pollution Prevention Plan (Section 5.2)
- Small Site Minimum Requirement #3 Source Control of Pollutants (Section 5.3, not required for single family residential sites)
- Small Site Minimum Requirement #4 Preservation of Natural Drainage Systems and Outfalls (Section 5.4)
- Small Site Minimum Requirement #5 Onsite Stormwater Management (Section 5.5)
- Small Site Minimum Requirement #7 Flow Control (Section 5.7, may be waived under certain circumstances)
- Small Site Minimum Requirement #8 Wetland Protection (Section 5.8, if wetlands are on the site or the site drains to certain wetlands)
- Small Site Minimum Requirement #9 Operation and Maintenance (Section 5.9 if a structural BMP is installed)
- Small Site Minimum Requirement #11 Financial Liability (Section 5.11) for single family residential sites, applies only to stormwater systems constructed in or adjacent to Critical Areas or Critical Area buffers).

All nine of these Minimum Requirements may a not be applicable to any particular project. In most cases, Category 1 single family residential projects are subject to Minimum Requirements #1, #2, #4, #9 (possibly), and either Minimum Requirement #5 or #7 or a combination of both #5 and #7.

Category 2 Small Site Projects are subject to the Small Site Minimum Requirements listed for Category 1 Small Site Projects, as well as evaluating the applicability of the following for all *new and replaced impervious surfaces*, converted pervious surfaces, and disturbed pervious surface areas:

• Small Site Minimum Requirement #6 – Runoff Treatment (Section 5.6)

- Small Site Minimum Requirement #8 Wetland Protection (Section 5.8)
- Small Site Minimum Requirement #10 Offsite Analysis and Mitigation (Section 5.10).

All 11 of these Minimum Requirements may a not be applicable to any particular project. In most cases, Category 2 single family residential projects are subject to Minimum Requirements #1, #2, #4, #9 and either Minimum Requirement #5 or #7 or a combination of both #5 and #7

# 5.1 Small Site Minimum Requirement #1 – Preparation of Stormwater Site Plan

Stormwater Site Plans shall be prepared for all Small Site Projects. The Stormwater Site Plan shall document compliance with all applicable minimum requirements and the design of all BMPs. For all Category 2 Small Site Projects that involve 5,000 square feet or more of *new or replaced impervious surface* (Category 2), stormwater BMPs must be designed by a *civil engineer*.

This Stormwater Site Plan shall include the following:

- A complete dimension site plan, drawn to scale, showing area of proposed construction, modifications or repair, topographical information and a tally of the new and replaced impervious surface.
- Construction plan, details, and specifications when applicable of all stormwater control features.

Additional information may be required depending on the site conditions and proposed development. See handouts prepared by the City's Engineering Division for guidance and details on the submittal requirements.

The Stormwater Site Plan shall include the submittal requirements in the handout and reflect consideration of site planning and design measures intended to reduce the impact of the project on stormwater quality and quantity and should strongly consider the use of LID approaches as outlined in Section 3.0.

Table 5-1 summarizes some LID site planning measures that can be implemented, with references to guidance documents for further information.

Small Site Minimum Requirement #5 (Section 5.5) discusses LID techniques for managing stormwater runoff on site to reduce or eliminate the amount that flows offsite to *receiving waters*.

BMP#	Stormwater Management Technique	Reference(s)/Design Guidance
T5-21	Better Site Design (e.g., ,Reduce Effective Impervious Areas Associated with Roads, Shared Accesses, Alleys, Sidewalks, Driveways, and Parking Areas)	Volume V Stormwater Manual; Chapter 3 LID Manual
T5.20	Native Vegetation Protection, Reforestation, and Maintenance	Volume V Stormwater Manual; Chapter 4 LID Manual
	Minimize disturbance area	Volume V Stormwater Manual; Section 5 LID Manual
	Vegetated Roofs	City Building Division
	Rainwater Harvesting	LID Manual
	Permeable Pavement (asphalt, concrete, paving blocks, "grass-crete")	Section 6.3 LID Manual or Volume 3 Seattle Manual (base course requirements)

Table 5-1: Site Planning and Design Techniques to Reduce the Amount of Stormwater Runoff Generated

LID Manual = Low Impact Development: Technical Guidance Manual for Puget Sound.

Volume 3 Seattle Manual = Stormwater Flow Control & Water Quality Treatment Technical Requirements Manual.

Stormwater Manual = Stormwater Management Manual for Western Washington.

# 5.2 Small Site Minimum Requirement #2 – Construction Stormwater Pollution Prevention Plan

A Construction Stormwater Pollution Prevention Plan contains two parts: an Erosion and Sediment Control Plan and a Stormwater Spill Prevention Plan. Most Small Site Projects are only required to have an Erosion and Sediment Control Plan. Additional pollution prevention measures may be required based on site specific conditions or construction methods proposed.

All new development and redevelopment projects are responsible for preventing erosion and discharge of sediment and other pollutants into receiving waters during construction. See handouts prepared by the City's Engineering Division for guidance on preparing a stormwater pollution prevention plan for small sites. See Volume II of the Stormwater Manual for direction on BMP selection and design. The City of Edmonds does not approve erosivity waivers, as described in Section 4.2, Appendix 1 of the Phase II Permit.

# 5.3 Small Site Minimum Requirement #3 – Source Control of Pollution

All known, available, and reasonable *source control* BMPs shall be applied to control pollution. Source control BMPs shall be selected, designed, and maintained in according to the Stormwater Manual. See Volume IV of the Stormwater Manual for guidance on the applicable source control BMP selection and implementation.

Specific source controls are not required for single family residential sites. General requirements for these sites include preventing the discharge of pollutants to the City's storm drainage system per Edmonds City

Code Chapter 7.200 (Illicit Discharges). These pollutants include common household items such as pesticides, herbicides, fertilizers, detergents, and fluids from vehicle maintenance.

## 5.4 Small Site Minimum Requirement #4 – Preservation of Natural **Drainage Systems and Outfalls**

Natural drainage patterns shall be maintained, with run-on (from a potential upstream site) and runoff from effective impervious surface on the project site discharging via the location of the *natural drainage* system and outfall, to the maximum extent practicable. In most cases, the "natural location" is the existing discharge location at the site. For some redevelopment projects, the natural location for runoff discharge may have been previously altered. If there is a question as to the natural discharge location, contact City Engineering Division staff.

The manner in which runoff is discharged from the project site must not cause an adverse impact to downstream receiving waters and down-gradient properties. All outfalls require energy dissipation to prevent erosion. Minimum Requirement #10 describes offsite analysis that is required for certain Category 2 Small Site Projects to identify potential downstream concerns so that adverse impacts are avoided through appropriate design.

## 5.5 Small Site Minimum Requirement #5 – Onsite Stormwater Management

Onsite stormwater management BMPs described in this section are considered LID techniques. These onsite/LID techniques should be considered at all small sites to infiltrate, disperse, and retain stormwater runoff on site without causing flooding or erosion impacts. If properly designed in the right soil conditions, these onsite/LID BMPs can be used for flow control and/or runoff treatment to reduce the size of, or eliminate the need for, additional facilities designed to comply with Minimum Requirements #6 (Runoff treatment) and #7 (Flow Control), if applicable.

As stated in Small Site Minimum Requirement # 1, the use of LID approaches should begin at the site planning stage to minimize the amount of stormwater runoff that is released from a site. Once site planning and design are complete and the generation of offsite stormwater runoff is minimized, the stormwater runoff from the planned impervious surface and converted pervious surface areas may be mitigated.

The soil quality and depth BMP T5.13 for compost-amending, in Chapter 5 of Volume V of the Stormwater Manual is required for all disturbed pervious surface areas to restore the water holding capacity of these areas.

## 5.5.1 Onsite/LID BMP Selection

Common LID practices include but are not limited to:

- Bioretention cells (also known as rain gardens).
- Small-scale "traditional" infiltration techniques (such as trenches, dry wells, and gravelless chambers).
- Permeable pavement (asphalt, concrete, paving blocks, "grass-crete").
- Dispersion BMPs such as wheel strip driveways or other pavement sloped to drain to drain to onsite vegetation adequate for dispersion, or downspout or sheet flow dispersion.

Onsite/LID BMP design requirements shall be those in the LID Manual or the Washington State Department of Transportation's Highway Runoff Manual. BMP design requirements presented in other stormwater management manuals or standard documents approved by Ecology such as the City of Seattle and King County stormwater manuals are also acceptable when modified for local conditions such as precipitation and soil conditions. Table 5-2 presents a summary of Onsite/LID measures that could be used to manage stormwater onsite, along with references for design guidance information. Additional LID BMPs can be proposed as long as they are found in an Ecology-approved stormwater manual, appropriate for site conditions, and do not cause flooding or erosion impacts onsite or offsite.

LID techniques that rely on infiltration should be designed with caution, due to the prevalence of till or "hardpan" soil and steep slopes in Edmonds. Section 5.5.2 discusses this matter further.

**Table 5-2: Commonly Used Onsite/LID Stormwater Management Techniques** 

BMP#	Onsite Stormwater Management Technique	Reference(s)/Design Guidance
	Infiltratio	on BMPs
	Bioretention Facilities (Rain gardens)	Section 6.1 LID Manual and City Pre-Sizing Tables
-	Infiltration Trench (downspout or other)	City Pre-Sizing Tables
-	Drywell	City Pre-Sizing Tables
	Gravelless Chamber	City Pre-Sizing Tables
T5.13	Post-Construction Soil Quality and Depth (compost-amended)	Volume V Stormwater Manual; Section 6.1 LID Manual
	Dispersio	n BMPs
C.2.9.3	Wheel Strip Driveway	King County Manual. Appendix C.
	Downspout or Sheet Flow Dispersion Systems	City Pre-Sizing Tables

LID Manual = Low Impact Development: Technical Guidance Manual for Puget Sound.

City Pre-Sizing Tables are available from the City's Engineering Division

Stormwater Manual = Stormwater Management Manual for Western Washington.

King County Manual = 2009 Surface Water Design Manual.

## 5.5.2 Onsite/LID Techniques and Infiltration

Onsite/LID features that rely on infiltration are not appropriate for every site. Limitations and considerations include:

- Infiltration is prohibited in the North Edmonds Earth Subsidence and Landslide Hazard Area (ESLHA, see Appendix B) (ECDC Chapter 19.10), upgradient of the ESLHA, and other areas with geological instability (landslide hazard areas).
- Infiltration is prohibited in "steep slope areas" with average ground surface slopes equal to or greater than 15 percent (see Appendix B).
- Infiltration is prohibited within setbacks from the top of a designated landslide hazard or steep slope areas.
- Infiltration should be applied in areas that have higher infiltration rates (including Everett gravelly sandy loam soils).

When not restricted as noted above, infiltration should be used as much as possible in the Greater Lake Ballinger Watershed and in all other creek basins.

Soils reports are required where infiltration is proposed, and for individual lots they must include at least two soils logs for each proposed infiltration location. Each log shall correspond to soil conditions extending a minimum of 4 feet depth below ground surface (6 feet for drywells). The report shall describe the Soil Conservation Service (SCS, now called the Natural Resource Conservation Service or NRCS) series of the soil and the textural class of each horizon through the depth of the log, and it shall include notes of any evidence of a high groundwater table, such as mottling. Reports solely using the Unified Soil Classification System (USCS) will not be accepted. Soils reports must be prepared by or under the direction of a licensed onsite sewage system designer, civil engineer, engineering geologist, or geotechnical engineer.

A soils report produced for siting and design of an onsite sewage system may also be used to satisfy this soils report requirement, provided that (a) the depth of the soil log(s) is at least 4 feet, (b) the depth to seasonal high water table is determined, and (c) the location of the soil logs is adequate to determine the feasibility of the infiltration system.

Field infiltration rates can be evaluated using one of two approved methods: the USDA Textural Classification, or the Modified Pilot Infiltration Testing (PIT) Method.

A correction factor shall be applied to the measured infiltration rate to convert to the design infiltration rate. This correction factor shall be different based on the time of year of the test. If the test is conducted from May 1 through October 31, the correction factor shall be two times the correction factor listed in Table C-1 (USDA method) or Table C-2 (modified PIT method) in Appendix C of this Supplement. For infiltration rates tested from November 1 – April 30, the correction factor shall be equal to the correction factor listed in Table C-1 (USDA method) or Table C-2 (modified PIT method) in Appendix C of this Supplement.

In certain situations, BMPs that rely on infiltration are classified as Underground Injection Controls (UICs) and may be regulated by Ecology under the UIC Program (Washington Administrative Code [WAC] 173 218). For more information on Underground Injection Control (UIC) see the 2006 Ecology document titled Guidance for UIC Wells that Manage Stormwater. This document is available online at <a href="http://www.ecy.wa.gov/biblio/0510067.html">http://www.ecy.wa.gov/biblio/0510067.html</a>.

## 5.5.3 Bioretention Cells or Rain Gardens for Single Family Residential Sites

Rain gardens may be designed using the Rain Garden Handbook for Western Washington Homeowners (WSU Extension 2009) (without the services of certified geotechnical professional) under the following circumstances:

- The area of *land-disturbing activity* on the site is below the regulatory threshold (1 acre of land-disturbing activity).
- The site is zoned as single-family residential.
- The rain garden(s) will receive runoff from less than 2,000 square feet of impervious surface.

If the amount of new, replaced, or new plus replaced impervious surface area (regulated impervious area) is 2,000 square feet or greater, the applicant may subtract the amount of regulated impervious surface area that will be served by the rain garden(s) from the total regulated impervious surface area. The balance of the regulated impervious surface area will still be subject to all applicable minimum requirements (even if this balance is less than 2,000 square feet). For example, suppose a Category 1 single-family residential Small Site Project has 3,700 square feet of regulated impervious surface area. An owner plans to use two rain gardens designed per the Rain Garden Handbook for Western Washington Homeowners, each handling 950 square feet of regulated impervious surface area. The owner must apply other BMPs to the remaining 1,800 square feet of regulated impervious surface area to meet this minimum requirement.

If a rain garden is removed from service at any time, the impervious surface draining to it becomes new impervious surface subject to applicable stormwater requirements.

### Small Site Minimum Requirement #6 – Runoff Treatment 5.6

Runoff treatment BMPs, if applicable, must handle the water quality design storm volume or peak flow rate using the appropriate treatment type (basic, enhanced, oil control, and/or phosphorus treatment) for all new and replaced project pollution generating surfaces. BMPs to meet this minimum requirement must be designed by a civil engineer.

## 5.6.1 Project Thresholds

Stormwater treatment facilities are required for the following Category 2 Small Site Projects:

- Projects in which the total of new and replaced effective, pollution-generating impervious surface (PGIS) is 5,000 square feet or more in a threshold discharge area of the project.
- Projects in which the total of *pollution-generating pervious surfaces* (PGPS) is threequarters (3/4) of an acre or more in a threshold discharge area, and from which there is a surface discharge from the site into a natural or man-made conveyance system from the

That portion of any development project in which the PGIS or PGPS thresholds listed above are not exceeded in a threshold discharge area should consider the use onsite stormwater management BMPs in accordance with Small Site Minimum Requirement #5 to the maximum extent practicable.

## 5.6.2 Runoff Treatment Standards

Runoff treatment standards shall be implemented per Section 4.6, Appendix 1 of the Phase II Permit. In addition, the following Edmonds-specific requirements apply.

## 5.6.2.1 Oil Control

All projects in areas not zoned as single family residential that collect runoff from 5 or more parking spaces shall install oil containment catch basins, if other approved oil control systems are not employed. The outlet pipe of these catch basins shall have a downturned 90 degree elbow to restrict the outflow of oil and other floatables. There should be at least 9 inches of clearance between the elbow and the inside wall of the catch basin to facilitate removal of floatables. A maintenance schedule for the removal of oil and other floatables from these catch basins must be submitted with all plans for review.

## 5.6.2.2 Phosphorus Treatment

Per Section 4.6.2, Appendix 1 of the Phase II Permit, phosphorus treatment is required for projects that discharge to a nutrient-critical receiving water. Currently, this applies to projects in the Greater Lake Ballinger Watershed that have a total maximum daily load (TMDL) for phosphorus. Bioretention systems with overflows (i.e., systems not providing 100 percent infiltration) should not be used in this basin due to potential phosphorus export.

## 5.6.3 Runoff Treatment BMP Selection

A sampling of runoff treatment BMPs is summarized in Table 4-3, Section 4.6, with the treatment levels and design criteria references. BMPs shall be selected from the list according to the treatment type required, and according to the following general prioritization guidelines:

• Bioretention systems should be implemented where feasible in creek basins. If infiltration of runoff is not feasible at the site, consider use of bioretention systems with underdrains.

• Onsite stormwater management measures (see Section 5.5 above) are preferred, if feasible, over larger runoff treatment facilities. Be sure that these onsite techniques are being applied to the maximum extent practicable before selecting runoff treatment BMPs.

#### 5.7 Small Site Minimum Requirement #7 – Flow Control

To reduce the impacts of stormwater runoff from impervious surfaces and land cover conversions, flow control BMPs shall be implemented for all effective impervious surface that is new and replaced and converted pervious surfaces. To meet this minimum requirement, flow control BMPs for Category 2 Small Site Projects must be designed by a civil engineer. As discussed in Section 5.5.1, the use of LID techniques under Small Site Minimum Requirements #1 and #5 can reduce or eliminate the need for compliance with this minimum requirement.

## **Project Thresholds and Applicability**

The applicability of this minimum requirement is dependent upon the drainage basin of the project site. See Chapter 2 for drainage basin classifications.

## Creek or Lake Basin Projects

For Small Site Projects in Creek or Lake Basins, Edmonds-specific flow control standards must be met if the total new and replaced impervious surface area exceeds 2,000 square feet.

## Direct Discharge Basin Projects

For Small Site Projects in *Direct Discharge Basins* Edmonds-specific flow control standards must be met if the total new and replaced impervious surface area exceeds 2,000 square feet. Small Site Projects in Direct Discharge Basins can be exempt from Small Site Minimum Requirement #7 under any one of the following circumstances:

- A quantitative offsite analysis as described in Small Site Minimum Requirement #10 is performed by the applicant and no unacceptable downstream issues are found.
- A quantitative offsite analysis as described in Small Site Minimum Requirement #10 is performed by the applicant and one or more unacceptable downstream issue is discovered. A plan is proposed by the applicant to mitigate for the unacceptable downstream issue and the mitigation plan is approved by the Public Works Director or designee.

Any Small Site Project in a Direct Discharge Basin can be exempt from Small Site Minimum Requirement # 10 by meeting the applicable flow control standards for sites in Creek or Lake Basins (see Section 5.7.2).

## 5.7.2 Flow Control Standards

Flow control standards for Small Site Projects vary by basin type and the amount of new and replaced effective impervious surface area and whether the project is in a Creek or Lake Basin or a Direct Discharge Basin. These standards are summarized in Table 5-3 and 5-4 below.

Small Site Projects in Creek or Lake Basins must meet the Edmonds-specific flow control standards. Recurrence interval flows for the developed condition shall be determined using a continuous hydrologic model. For sites with 2,000 square feet or greater (and less than or equal to 5,000 square feet) of new plus replaced effective impervious surface area the post-development 10-year recurrence interval flow shall not exceed 0.25 cubic feet per second (cfs) per acre of impervious surface area.

For sites with greater than 5,000 square feet of new plus replaced impervious surface area, limits for the post-development peak flows depend upon the BMP type selected:

## • For detention BMPs:

- Creek or Lake Basins: the post-development 2-, 10-, and 100-year recurrence interval peak flows shall not exceed 0.07, 0.14, and 0.33 cfs per acre of impervious surface area, respectively.
- Direct Discharge Basins: the post-development 10-, and 100-year recurrence interval peak flows shall not exceed, 0.25 and 0.45 cfs per acre of impervious surface area, respectively.

## • For infiltration BMPs:

- Creek or Lake Basins: the post-development\_2-, 10-, and 100-year recurrence interval peak overflows shall not exceed 0.07, 0.25, and 0.45 cfs per acre impervious surface area, respectively.
- Direct Discharge Basins: the post-development 10-, and 100-year recurrence interval peak overflows shall not exceed 0.25, and 0.45 cfs per acre impervious surface area, respectively.

There are two methods to satisfy Minimum Requirement #7 for sites subject to the Edmonds-specific standard: the "LID Credit Option" and the "Traditional Option". Small Site Projects should strongly consider the LID Credit Option to implement flow control, if feasible. The LID Credit Option allows an applicant to mitigate only a portion of the new and replaced impervious surface area if only LID site planning techniques and LID BMPs are used. The requirements for the LID Credit Option are presented below:

- For projects that generate greater than 2,000 square feet (but less than or equal to 5,000 square feet) of new plus replaced effective impervious surface area, the greater of 1) 2,000 square feet or 2) 85 percent of new plus replaced impervious surface area is mitigated to meet the flow control standard using LID measures.
- For projects that generate greater than 5,000 square feet of new plus replaced effective impervious surface area, the greater of 1) 5,000 square feet or 2) 90 percent of new plus

replaced impervious surface area is mitigated to meet the flow control standard using LID measures.

If the LID Credit Option is not used to meet Minimum Requirement #7, the project shall meet the flow control standard for all new and replaced impervious surface and converted pervious surface. In this case, the "Traditional Option", larger-scale infiltration BMPs or detention BMPs may be used to provide flow control for the areas not mitigated using LID techniques.

City of Edmonds Flow Control Requirements for Small Site Projects - Creek or Lake Basins <sup>a</sup> **Table 5-3:** 

	≥2,000 sf Effective Impervious Area <sup>b</sup>	≥5,000 sf Effective Impervious Area
	Numerical Standard	
Maximum Recurrence Interval Flow from	10-year = 0.25 cfs/acre impervious	For detention BMPs:  2-year = 0.07 cfs/acre impervious,  10-year = 0.14 cfs/acre impervious, and  100-year = 0.33 cfs/acre impervious.
Developed Site:		For infiltration BMPs:  2-year = 0.07 cfs/acre impervious,  10-year = 0.25 cfs/acre impervious, and  100-year= 0.45 cfs/acre impervious.
Applies to:	New and replaced impervious surface	New and replaced impervious surface
Computational Methods	Computational         Simplified Sizing Approach or continuous hydrologic modeling with           Methods         MGS precipitation data %d	Simplified Sizing Approach or continuous hydrologic modeling with MGS precipitation data <sup>c,d</sup>
	Options to Meet Numerical Standard	Standard
LID Credit Option (If feasible)	If 2,000 sf or 85% of new plus replaced impervious surface area (whichever is greater) is mitigated to the numerical standard using Onsite/LID techniques (Minimum Requirement #5), the requirement is met.	If 5,000 sf or 90% of new plus replaced impervious surface area (whichever is greater) is mitigated to the numerical standard using Onsite/LID techniques (Minimum Requirement #5), the requirement is met.
Traditional Option	If not feasible to achieve standard with Onsite/LID option, numerical standard must be achieved for the entire site. Larger-scale infiltration or detention may be used — see Section 5.7.4.	If not feasible to achieve standard with Onsite/LID option, numerical standard must be achieved for the entire site. Larger-scale infiltration or detention may be used – see Section 5.7.4.

cfs: cubic feet per second

sf: square feet

LID: low impact development

Sites with less than 1-acre of land-disturbing activities

<sup>b</sup> But less than 5,000 sf of new plus replaced effective impervious surface

<sup>e</sup> MGS precipitation is the Puget East 36 precipitation time series developed for the Washington State Department of Transportation by MGS Engineering Consultants, Inc. and available in WWHM and MGS Flood hydrologic modeling software.

For infiltration facilities, flood frequency calculations (i.e., determination of recurrence interval peak flows) must be performed using an approach capable of properly evaluating zero flow years as explained in Section 5.7.3.1 below.

**Table 5-4:** City of Edmonds Flow Control Requirements for Small Site Projects - Direct Discharge Basins<sup>a</sup>

	≥ 2,000 sf Effective Impervious Area
Numerical	For detention and infiltration BMPs:
Standard:	10-year = 0.25 cfs/acre impervious, and 100-year= 0.45 cfs/acre impervious
	An exemption from these flow control standards may be allowed by the Public Works Director or designee if a quantitative offsite analysis per Large Site Minimum Requirement # 10 (see Section 4.10) indicates no unacceptable downstream issue (such as a capacity or erosion issue). If an unacceptable downstream issue is found, the applicant can either propose mitigation of the issue to the Public Works Director or designee (whom will consider the proposal but not necessarily approve it) or design and implement flow control measures to the Lake or Creek Basin Standard (see Section 5.7.1).
Applies to:	New and replaced impervious surface and disturbed pervious areas
Computational Methods	Simplified Sizing Approach or continuous hydrologic modeling with MGS precipitation data a, b
	Options to Meet Numerical Standard
LID Credit Option (If feasible)	For sites with 2,000 sf or more (but less than 5,000 sf) of effective impervious surface: If 2,000 sf or 85% of new plus replaced impervious surface area (whichever is greater) is mitigated to the numerical standard using Onsite/LID techniques (Minimum Requirement #5), the requirement is met.
	For sites with 5,000 sf or more of effective impervious surface: If 5,000 sf or 90% of new plus replaced impervious surface area (whichever is greater) is mitigated to the numerical standard using Onsite/LID techniques (Minimum Requirement #5), the requirement is met.
Traditional Option	If Onsite/LID techniques are not feasible, larger-scale infiltration or detention may be used to mitigate capacity impact to the extent necessary - See Section 5.7.4.

sf square feet

## 5.7.3 Flow Control Facility Sizing

## 5.7.3.1 Modeling Requirements

Flow control facilities must be sized to meet the standards described above using an approved continuous simulation runoff model. Guidance on application of continuous runoff models for flow control BMP sizing is provided in Volume III of the Stormwater Manual. Supplemental guidance is provided in this section.

Approved continuous runoff models include the Western Washington Hydrologic Model (WWHM) and MGS-Flood. Flow control sizing must be conducted using the "Puget East 36" precipitation time series developed by MGS Engineering Consultants (MGS 2002). This time series is available in WWHM (labeled "DOT data"), and is one of the default precipitation time series in MGS-Flood.

Flood frequency calculations (i.e., determination of recurrence interval peak flows) must also be performed for infiltration facilities, using an approach capable of properly evaluating zero flow years.

MGS precipitation is the Puget East 36 precipitation time series developed for the Washington State Department of Transportation by MGS Engineering Consultants, Inc. and available in WWHM and MGS Flood hydrologic modeling software.

For infiltration facilities, flood frequency calculations (i.e., determination of recurrence interval peak flows) must be performed using an approach capable of properly evaluating zero flow years as explained in Section 5.7.3.1 below

This is important, because infiltration facilities sized to meet the recommended flow control standards will infiltrate approximately 98 percent of the runoff volume, resulting in an annual peak flow time series that contains several zero or very low peak flow values.

Currently, the MGS-Flood model properly calculates flood frequency for these scenarios, but WWHM does not. Until WWHM integrates a more flexible flood frequency routine, it is recommended that annual peak flow datasets with multiple low or zero annual peak flow values be exported from WWHM and analyzed using a spreadsheet method to determine flood frequency (i.e., 2-, 10-, and 100-year recurrence interval flows). The Gringorten plotting position formula (Maidment 1993), which is non-parametric (i.e., does not depend on the mean, standard deviation, or skew of the data), works well for these applications.

### 5.7.3.2 Simplified Sizing Approach

A pre-sized approach for sizing flow control BMPs has been developed for Small Site Projects in Edmonds with between 2,000 and 10,000 square feet of new and replaced impervious surface area. This approach allows the designer to size selected BMPs to meet the numerical flow control standards without the use of a continuous hydrologic model. Guidance for using the simplified sizing approach for flow control BMPs is provided in handouts available from the City Engineering Division.

#### 5.7.4 Flow Control BMP Selection

This section discusses infiltration and flow control BMPs. If onsite/LID techniques are not used, flow control can be achieved using larger-scale infiltration or detention facilities.

### 5.7.4.1 Larger Scale Infiltration

If LID techniques are not feasible to meet this minimum requirement, larger-scale, centralized infiltration facilities may be used (as opposed to the small and distributed infiltration facilities associated with LID). Infiltration is a preferred method of stormwater flow control relative to detention, but only in certain areas of Edmonds where infiltration of large amounts of runoff in a concentrated area will not contribute to flooding or offsite slope stability problems. The feasibility of infiltration as a means to meet stormwater flow control and treatment requirements will depend upon specific project site locations due to the variations in soil and topography across the City. See Chapter 5.5.2 for guidelines pertaining to the applicability and testing required for implementing infiltration for flow control.

A sampling of infiltration BMPs for flow control is summarized in Table 5-5.

#### 5.7.4.2 Detention

If infiltration BMPs are not feasible to meet flow control requirements for a site, detention BMPs can be used. The minimum orifice size for a detention control structure is one-half inch (1/2 inch). Table 5-4 summarizes some available detention BMPs for flow control.

### 5.8 Small Site Minimum Requirement #8 - Wetland Protection

Section 2.5.8 of Volume I of the Stormwater Manual has guidance on meeting Small Site Minimum Requirement #8. Refer also to ECDC Chapter 23.40.

### 5.9 Small Site Minimum Requirement #9 – Operation and Maintenance

BMPs shall be maintained in accordance with the provisions in Chapter 7 of this Supplement.

Table 5-5: Flow Control Best Management Practices

BMP#	Flow Control BMP	Reference(s)/Design Guidance			
······································	Larger-Scale Infiltration BMPs				
T7.10	Infiltration Basins	Volume III Stormwater Manual			
T7.20	Infiltration Trenches	Volume III Stormwater Manual			
T7.30	Infiltration Vaults	Volume III Stormwater Manual			
	Gravelless Chambers	Kitsap County Stormwater Management Design Manual (Kitsap County 1997)			
	D	etention BMPs			
	Detention Ponds	Volume III Stormwater Manual			
	Detention Tanks	Volume III Stormwater Manual			
	Detention Vaults	Volume III Stormwater Manual			
	Use of Parking Lots for Detention	Volume III Stormwater Manual			
	Use of Roofs for Detention	Volume III Stormwater Manual and City Building Division			

Stormwater Manual = Stormwater Management Manual for Western Washington.

# 5.10 Small Site Minimum Requirement #10 - Offsite Analysis and Mitigation

Offsite analyses assess upstream and downstream conditions, including conveyance capacity limitations or erosion potential in the downstream system. A *qualitative* or *quantitative* analysis may be required by the Public Works Director or a designee when there is a potential for downstream flooding or erosion. If a problem is found, mitigation is required to prevent worsening the problem.

The existing or potential impacts to be evaluated and mitigated as part of any offsite/downstream analysis shall include:

- Conveyance system capacity problems.
- Localized flooding.
- Wetlands impacts such as siltation or other damage.
- Upland erosion impacts, including landslide hazards.
- Stream channel erosion in the channel or at the outfall location.

• Locations where surface water enters and exits the site.

### 5.10.1 Qualitative Analysis

If required, project applicants shall submit a *qualitative* analysis of each upstream drainage system entering a site (run-on) and each downstream drainage system leaving a site (runoff). The upstream analysis shall identify and describe points where water enters the site and the tributary area. The qualitative analysis shall extend downstream for the entire flow path, from the project site to the receiving water, or up to one-quarter mile, whichever is less. A map defining the onsite and offsite areas that contribute stormwater runoff to the site shall be provided by the applicant. The map shall be prepared with a defined scale.

Upon review of this analysis, the Public Works Director or Designee may require a qualitative analysis extending further downstream, mitigation measures deemed adequate to address the problems, or a quantitative analysis, depending upon the presence of existing or predicted flooding, erosion, or water quality problems, and on the proposed design of the onsite drainage facilities.

### 5.10.2 Quantitative Analysis

If required, a *civil engineer* or professional land surveyor must field survey all existing storm drainage systems downstream of the project site for a minimum distance of 1/4-mile from the point of connection to the existing public drainage system. If the ultimate discharge point is to Puget Sound via a culvert owned by BNSF Railway, the analysis must be followed through the drainage system all the way to Puget Sound.

The goal of the inspection and analysis is to evaluate whether the capacity of the drainage system(s) is adequate to handle the existing flows, flows generated by the project, flooding problems, erosion damage or potential, amount of freeboard in channels and pipes, and storage potential within the system. All existing and proposed offsite surface water conveyance systems shall be sized to convey flows without surcharging the City's storm system or the BNSF culvert under the railroad tracks (if applicable) during the 50-year recurrence event. If the project is in the ESLHA (see Appendix B), contact the City Engineering Division for requirements.

If a capacity problem, streambank erosion problem, or other problem with the downstream system is encountered in the analysis, the flow from the project shall be restricted per Minimum Requirement #7 – Flow Control or other mitigation may be proposed by the applicant subject to review by the Public Works Director or designee..

### 5.11 Small Site Minimum Requirement #11 - Financial Liability

A performance bond shall be posted as a financial guarantee for required stormwater systems and BMPs related to Construction Stormwater Pollution Prevention Plans for the following Small Site Projects:

- Single family residential projects located within *Critical Areas* (including the ESLHA) and critical area buffers.
- Multi-family residential and commercial projects
- Subdivisions involving 7,000 square feet or more of land disturbing activity.

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### **6.0 Minor Site Requirements**

Minor Site Projects must comply with Minor Site Construction Stormwater Pollution Prevention Practices.

# 6.1 Minor Site Minimum Requirement – Construction Stormwater Pollution Prevention Plan

All new development, redevelopment, and construction projects are responsible for preventing erosion and discharge of sediment and other pollutants into the City's municipal storm drainage system and receiving waters. For Minor Site Projects, a shorter Minor Site Construction Stormwater Pollution Prevention Plan can be prepared.

The following BMPs must be applied:

### For Sites with Clearing and Grading:

- Plan and implement proper clearing and grading of the site. It is most important to clear only the areas needed, preserve vegetation, protect soils, and keep exposed areas to a minimum.
- Re-vegetate, cover with straw, or otherwise stabilize all exposed soil as soon as possible.
- Locate any soil piles away from drainage systems. Temporary stabilization or covering of soil piles must occur at the end of each work day or other best management practices must be implemented to prevent discharges of soil or sediment to the City's storm drainage system or surface waters or adjacent properties.
- Provide storm drain inlet protection within the project area and downstream as required
  to prevent sediment and pollutants from entering the City's storm drainage system. Inlet
  protection must be maintained throughout the life of the project and not cause any
  discharge of sediment or localized flooding issues. All inlet protection must be removed
  and properly disposed of immediately after project completion.

### Additional Requirements for Underground Utility Projects

- Areas within the paved City right-of-way that have soil or sediment deposited during
  construction must be swept or otherwise removed and properly managed at the end of
  each work day, unless other arrangements have been made with the City's Engineering
  Division.
- Water-tight trucks must be used to transport any saturated soils from the site.
- All contractors must a have a spill containment and clean up kit onsite at all times that is compatible with the applicable pollutants
- All utility workers must exercise proper pollution prevention techniques during all construction activities including the proper storage of any hazardous materials.

De-watering shall be controlled per Element #10, Section 3.2.3, Volume II, of the Stormwater Manual. All discharges into the City-owned storm system or water of the state shall be in compliance with ECC 7.200, Illicit Discharges. Sanitary sewer discharges must have the approval from the Edmonds Treatment Plant and Engineering Division.

See Volume II of the Stormwater Manual for additional guidance on the selection and design of construction-phase best management practices designed to prevent erosion and sedimentation.

# 7.0 Operation and Maintenance Requirements

See the LID Manual and Volume III and Volume V of the Stormwater Manual for guidance on operation and maintenance measures for BMPs.

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# 8.0 Terminology

This section explains terms used in this Supplement. Additional definitions for stormwater requirements are found in ECDC 18.30.010 and the Stormwater Manual.

**Basin plan**: A plan or study to manage the quality and/or quantity of stormwater or water bodies within a watershed that has been formally adopted by the City of Edmonds.

Civil engineer: A professional engineer licensed in the state of Washington in civil engineering.

**Direct discharge basin**: A drainage basin that discharges runoff directly to Puget Sound via a pipe system, ditch, or other direct means without first entering a creek or other water body.

**Disturbed pervious surface**: Any part of a pervious area that is disturbed during a development or redevelopment project, but remains pervious after the project is completed.

**Effective impervious surface:** Those impervious surfaces that are connected via sheet flow or discrete conveyance to the City's municipal separate storm sewer system.

**Grade**: The slope of a surface such as a road, channel, or natural ground.

**Grading**: Any one or a combination of the following: excavating, filling, or disturbance of that portion of the soil profile that contains decaying organic matter.

**Greater Lake Ballinger Watershed**: That portion of the City of Edmonds that discharges stormwater runoff directly or indirectly into Chase Lake, Hall Creek, or Lake Ballinger.

**Mitigation**: Implement best management practices to reduce or eliminate the impacts of development on the City's stormwater system and receiving waters.

**Nutrient-critical receiving water**: Any surface water or water segment listed as Category 5 (impaired) under Section 303(d) of the Clean Water Act for total phosphorus through the State of Washington's Water Quality Assessment program and approved by EPA. Lake Ballinger is considered a nutrient-critical receiving water.

**Pollution-generating impervious surfaces (PGIS)**: Those impervious surfaces considered to be a significant source of pollutants in stormwater runoff. Such surfaces include those which are subject to:

- · Vehicular use
- Industrial activities as defined in the Stormwater Manual (Volume I, Glossary- p. 26)
- Storage of erodible or leachable materials, wastes, or chemicals
- Receiving direct rainfall or the run-on or blow-in of rainfall.

Erodible or leachable materials, wastes, or chemicals are those substances which, when exposed to rainfall, measurably alter the physical or chemical characteristics of the rainfall runoff. Examples include erodible soils that are stockpiled, uncovered process wastes, manure, fertilizers, oily substances, ashes, kiln dust, and garbage dumpster leakage.

Metal roofs are also considered PGIS unless they are coated with an inert, non-leachable material (e.g., baked-on enamel coating). A surface, whether paved or not, shall be considered subject to vehicular use if it is regularly used by motor vehicles. The following are considered regularly-used surfaces:

- Roads
- · Unvegetated road shoulders
- Bike lanes within the traveled lane of a roadway
- Driveways
- · Parking lots
- Unfenced fire lanes
- Vehicular equipment storage yards
- Airport runways.

The following are not considered regularly used surfaces:

- Paved bicycle pathways separated from and not subject to drainage from roads for motor vehicles
- Fenced fire lanes
- Infrequently used maintenance access roads
- Sidewalks separated from and not subject to drainage from roads for motor vehicles.

**Pollution-generating pervious surfaces (PGPS)**: Any non-impervious surface subject to application of pesticides or fertilizers, or loss of soil. Typical PGPS include lawns, landscaped areas, golf courses, parks, cemeteries, and sports fields.

**Predevelopment condition**: For sites that meet or exceed the regulatory threshold, and exceed the thresholds that require flow control in Table 4.2, Section 4.7 of the Phase II Permit, shall use the appropriate predevelopment condition described in said section of the Phase II Permit.

**Regulatory Threshold**: When referring to site size, those that have one acre or more of land-disturbing activity, including projects less than one acre of land-disturbing activity that are part of a larger *common plan of the development or sale*.

**Total Maximum Daily Load (TMDL):** A TMDL is a calculation of the maximum amount of a pollutant that a *water body* can receive and still meet water quality standards, and an allocation of that amount to

the pollutant's sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the state has designated. The calculation must also account for seasonable variation in water quality. Water quality standards are set by states, territories, and tribes. They identify the uses for each water body, for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. The Clean Water Act, section 303, establishes the water quality standards and TMDL programs. In Washington State, the Department of Ecology establishes water cleanup plans to guide TMDL implementation.

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### 9.0 References

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WSU Extension. 2009. Rain Garden Handbook for Western Washington Homeowners: Designing your Landscape to Protect our Streams, Lakes, Bays, and Wetlands. Washington State University Pierce County Extension, Tacoma, Washington.

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# Appendix A – Synopsis of the Western Washington Phase II Municipal Stormwater Permit

The City of Edmonds has a population of approximately 41,000 and owns and operates a municipal stormwater system that is separate from the sanitary sewer system. As such, the City is regulated by the Washington Department of Ecology (Ecology) to comply with the provisions of the Western Washington Phase II Municipal Stormwater Permit (Phase II Permit) for stormwater entering into and discharging from this municipal stormwater system.

The complete text of the NPDES Phase II Permit is available on Ecology's website <sup>1</sup>. This section provides a summary of permit provisions that relate to the City's management of stormwater.

Section S5.C.4 of the Phase II Permit prescribes how the City should regulate runoff from new development, redevelopment, and construction sites. For projects that involve 1 acre or more of land-disturbing activity <sup>2</sup> ("regulatory threshold"), the Phase II Permit requires compliance with certain minimum technical requirements. The City has adopted these minimum technical requirements from Appendix 1 of the Phase II Permit for sites that meet or exceed the regulatory threshold (Large Site Projects). Appendix 1 of the Phase II Permit also modifies or changes portions of the Stormwater Manual related to certain minimum requirements and exceptions/variances. These changes/additions have been incorporated into ECDC Chapter 18.30 and this Supplement and will be noted as such.

The Phase II Permit requires the City of Edmonds stormwater regulations to have a site planning process and BMP selection and design criteria that, when used to implement the Permit's minimum requirements (Appendix 1), will protect water quality, reduce the discharge of pollutants to the maximum extent practicable and satisfy the State requirement under Chapter 90.48 RCW to apply all known, available and reasonable methods of prevention, control and treatment (AKART) prior to discharge. The Phase II Permit also states that Permittees who choose to use the site planning process and BMP selection and design criteria in the Stormwater Manual, or an equivalent manual approved by Ecology under the Phase I Permit, may cite this choice as their sole documentation to meet this requirement. For Large Site Projects, the City of Edmonds has chosen to use the site planning process and BMP selection and design criteria in the Stormwater Manual, as modified by other equivalent manuals approved by the Department under the Phase I Permit. This Supplement provides details on implementing those requirements in Edmonds on sites of all sizes.

<sup>1</sup><a href="http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIIww/wwphiipermit.html">http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phaseIIww/wwphiipermit.html</a>

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<sup>&</sup>lt;sup>2</sup> Including projects less than 1 acre of land-disturbing activity that are part of a larger common plan of the development or sale.

For sites that fall below regulatory threshold, the Phase II Permit gives regulated jurisdictions a choice: 1) either continue to apply the local stormwater requirements in effect at the time of permit issuance (February 2007) or 2) apply the same minimum requirements as for the Large Site Projects. The City of Edmonds has chosen to continue using the current stormwater requirements for projects that fall below the regulatory threshold but to clarify the requirements and provide more choices (Best Management Practices or BMPs) for achieving these requirements including the use of Low Impact Development (LID) techniques. The most recent stormwater requirements for City of Edmonds were adopted in March 1995. The field of stormwater management has advanced substantially in the almost 15 years since adopting these requirements. This Supplement incorporates advancements that aim to strike a balance between encouraging desirable development and providing environmental protection.

Most development projects in Edmonds will only be subject to the Small Site Project or Minor Site Project requirements since very few parcels in the City are 1 acre or greater. The Small Site Project requirements are tailored to primarily address stormwater management issues related to development and redevelopment of single family residential projects in the urban environment of Edmonds. These projects make up the majority of the development activity in the City. These requirements apply to non-single-family residential projects as long as these sites meet the definition of a Small Site Project.

# Appendix B – Supplemental Technical Information

### **Edmonds Watersheds**

Broadly speaking, the stormwater runoff in Edmonds either travels west to Puget Sound (either via a creek or directly piped) or to the east to Lake Ballinger or Hall Creek, which discharges to Lake Ballinger (Figure B-1).

Lake Ballinger has a Department of Ecology-mandated limit on the amount of phosphorus (a chemical element) that can enter the lake. Excess phosphorus from stormwater runoff is the primary driver for unwanted algae blooms in the lake. Due to this limit (or TMDL-total maximum daily load) for total phosphorus imposed by Ecology, special water quality treatment requirements are included under Minimum Requirement #6 or Small Site Minimum Requirement #6. Private properties on the lake experience periodic flooding during large storm events. The City of Edmonds in conjunction with its watershed partners (Cities of Lynnwood, Mountlake Terrace, Shoreline and Lake Forest Park and Snohomish County) have developed a Strategic Action Plan for the greater Lake Ballinger/McAleer Creek Watershed to begin to address flooding a water quality issues in the basin.

### **Edmonds Soils and Slopes**

Edmonds is fortunate to be located adjacent to Puget Sound and possess topography that facilitates desirable views. The underlying soils and relatively steep slopes, however, complicate the application stormwater management techniques.

Prior to logging and subsequent development of the Edmonds area, trees and the forest duff layer above the soil surface (consisting or primarily or needles, leaves, branches, bark, and stems, in various stages of decomposition) covered the City. The tree canopy stored a large amount of the rainfall and the duff layer acted as a giant sponge storing and soaking up rainfall. Virtually all of this rainfall was stored in the tree canopy and the duff layer, absorbed by the roots of trees or other vegetation, or slowly moved through the soil on top of less permeable layers, forming the headwaters of Edmonds creeks. There was little or no "runoff" from these forests.

With logging came the elimination of the majority of the tree canopy and the duff layer and the elimination of the associated water-holding capacity. The soils that remain, in the vast majority of the City, once the forest is removed, is till or hard pan that does not store or absorb the rainwater. Rain water, instead, primarily becomes runoff that flows off the impermeable soils and the hardscape or impermeable surfaces built during development (roofs, parking lots, roads, sidewalks, etc.). This runoff is collected in ditches or pipes and these concentrated flows are discharged to creeks, Lake Ballinger, or Puget Sound

(without treatment). By planting trees and using compost-amended soils the water-holding capacity of a developed site can improve, to a limited extent.

The U.S. Department of Agriculture, Natural Resource Conservation Service or USDA-NRCS (formerly the Soil Conservation Service) has mapped soil types in Edmonds (Figure B-2). Based on the most recent data from 1983, approximately 82 percent of the land area in Edmonds is underlain by Alderwood series soils (till or hardpan). Approximately 12 percent of Edmonds has Type A or permeable soils. Given this soil regime, infiltration, and low impact development techniques that primarily rely on infiltration, are challenging to implement in the majority of Edmonds.

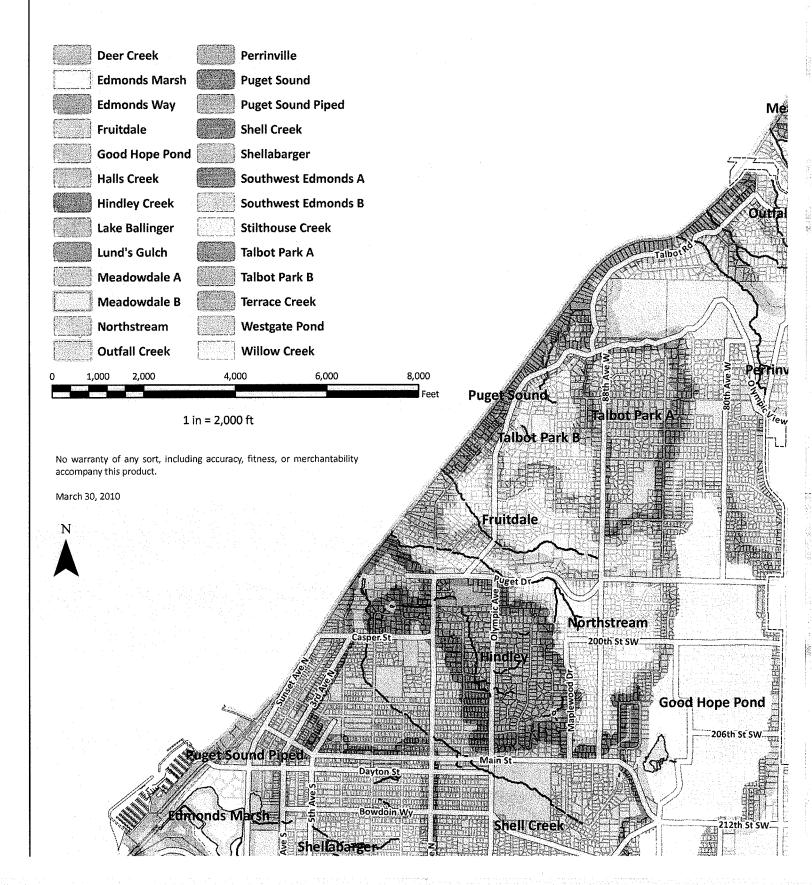
Approximately 25 percent of the land area of Edmonds has a slope of 15 percent or greater or is in an Earth Subsidence and Landslide Hazard Area (the Meadowdale area in the northernmost portion of the City) (Figure B-3). Geologic hazards in these areas can be increased when stormwater runoff from impervious surfaces percolates into the soil.

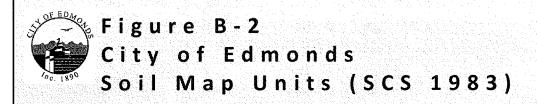
Planners and designers should use the information on Figures B-2 and B-3 as guidelines since soil and slope conditions on an individual parcel may vary from the information presented. Nevertheless, careful consideration should be applied when infiltration or LID techniques relying on infiltration are considered in areas of till soils or steep slopes.

There are areas in the City where infiltration and low impact development techniques that rely on infiltration are feasible based on favorable soil type and relatively flat slopes; Southwest Edmonds, for example. In these areas infiltration and LID techniques are encouraged over more conventional stormwater management techniques.



### FIGURE B-1 CITY OF EDMONDS WATERSHEDS





### **LEGEND**

--- City of Edmonds Boundary Soil Map Units SOIL\_NAME

> Alderwood Gravelly sandy loam, 2-8 % slopes Alderwood Gravelly sandy loam, 8-15 % slopes Alderwood Gravelly sandy loam, 15-25 % slopes Alderwood Urban land complex, 2-8 % slopes

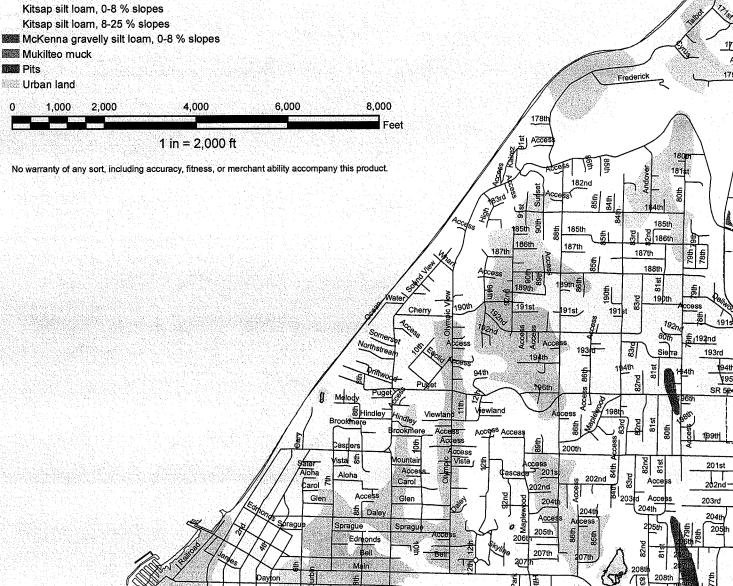
Alderwood Urban land complex, 8-15 % slopes Alderwood-Everett Gravelly sandy loams, 25-70 Custer fine sandy loam

Everett gravelly sand loam, 0-8 % slopes Everett gravelly sand loam, 8-15 % slopes

Everett gravelly sand loam, 15-25 % slopes Fluvaquents, tidal

McKenna gravelly silt loam, 0-8 % slopes

Pits





# Figure B-3 City of Edmonds Slopes Greater than 15 percent and North Edmonds Earth Subsidence & Landslide Hazard Area (ESLHA)

### **LEGEND**

North Edmonds Earth Subsidence & Landslide Hazard Area

\_\_\_ City of Edmonds Boundary

Slope >15%

Note: For the ESLHA see ECDC 23.80.020 B.1. and ECDC 19.10. 6,000 8,000 1.000 2,000 1 in = 2,000 ftNo warranty of any sort, including accuracy, fitness, or merchant ability accompany this product.

# Appendix C – Approved Methods for Obtaining Design Infiltration Rates

This appendix supplements the infiltration requirements found in Sections 4.5.2 and 5.5.2 of this document. The Unites States Department of Agriculture (USDA) textural classification or the modified pilot infiltration test (PIT) may be used to obtain a site design infiltration rate. The City may require the modified PIT procedure on large sites and/or on sites that demonstrate considerable variability between samples using the USDA textural classification.

### **USDA Textural Classification**

Short-term infiltration rates may be estimated from soil grain size distribution (gradation) data using the USDA textural analysis approach. This estimated short-term infiltration rate can then be converted to a design infiltration rate using information in the Stormwater Manual.

The soil particle size distribution and soil texture analysis to obtain a short-term infiltration rate should be implemented in accordance with the USDA (Soil Survey Manual, USDA, October 1993, Chapter 3 pages 60-65).

This manual only considers soil passing the #10 sieve (2 mm) (U.S. Standard) to determine percentages of sand, silt, and clay for use in Figure C-1. These short-term (field) infiltration rates should be used with the required correction factors in the Stormwater Manual to obtain the design (long-term) infiltration rates (Table C-1 below from the Volume 3 of the Stormwater Manual). With prior approval by the City of Edmonds Engineering Division, the correction factors may be reduced (to a minimum of 2.0) if there is little soil variability and there will be a high degree of long-term facility maintenance and adequate pretreatment to reduce total suspended solids in influent stormwater.

Table C-1: Recommended Infiltration Rates Based on USDA Soil Textural Classification

	*Short-Term Infiltration Rate (in./hr)	Correction Factor CF	Estimated Design (Long-term) Infiltration Rate (in./hr)
Clean sandy gravels and gravelly sands (i.e., 90% of the total soil sample is retained in the #10 sieve)	20	2	10
Sand	8	4	2
Loamy Sand	2	4	0.5
Sandy Loam	1	4	0.25
Loam	0.5	4	0.13

Source: Stormwater Management Manual for Western Washington (Ecology 2005).

<sup>\*</sup> From WEF/ASCE (1998).

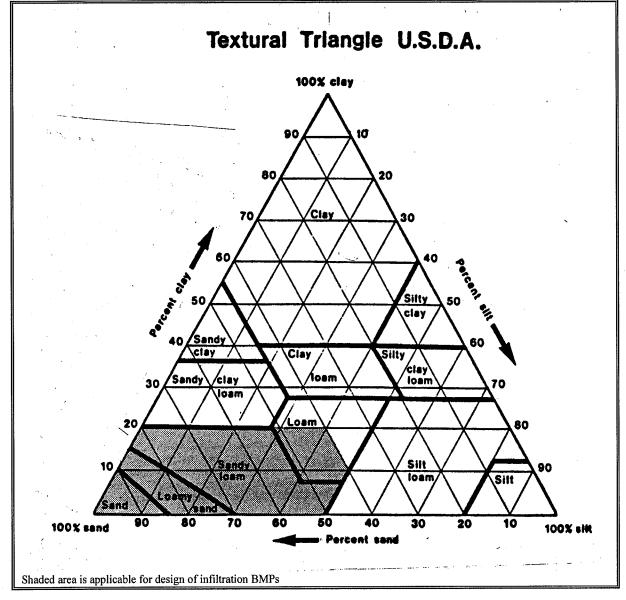


Figure C-1: Soil Classification Based on the Textural Triangle

### **Modified Pilot Infiltration Testing (PIT) Method**

The Pilot Infiltration Test (PIT) consists of a relatively large-scale infiltration test to better measure infiltration rates for design of stormwater infiltration facilities. The PIT reduces some of the scale errors associated with relatively small-scale double ring infiltrometer or "stove-pipe" infiltration tests. It is not a standard test but rather a practical field procedure based on the methods recommended by Ecology's Technical Advisory Committee. Correction factors must be applied to the infiltration rate measured using PIT to establish a design infiltration rate for BMP sizing.

For infiltration basins, there shall be one test pit per 5,000 square feet of basin infiltrating surface with a minimum of two per basin, regardless of basin size. For bioretention facilities and permeable pavement facilities, there shall be one test pit per 5,000 square feet of contributing area. For infiltration trenches, there shall be one test pit per 50 feet of trench length. For drywells, there shall be at least one test pit per well.

Prepare detailed logs for each test pit and a map showing the location of the test pits. Logs must include the depth, depth to water, evidence of seasonal high groundwater elevation, existing ground surface elevation, proposed facility bottom elevation, and presence of stratification that may impact the infiltration design.

PIT reports shall be stamped by a Professional Engineer or prepared by an onsite wastewater treatment designer licensed with the State of Washington.

#### Infiltration Test

- Excavate the test pit to the depth of the bottom of the proposed infiltration facility. Lay back or otherwise stabilize the slopes sufficiently to avoid caving and erosion during the test. A pre-formed, bottomless box made of plywood can be useful for limiting the size of the excavation.
- The size of the bottom of the test pit should be as close to the size of the planned infiltration facility as possible, but not less than 2 feet by 2 feet. Where water availability is a problem, smaller areas may be considered as determined by the site professional.
- Accurately document the size and geometry of the test pit.
- Install a device capable of measuring the water level in the pit during the test. This may be a pressure transducer (automatic measurements) or a vertical measuring rod (minimum 5 feet long) marked in half-inch increments in the center of the pit bottom (manual measurements).
- Use a rigid 6-inch-diameter pipe with a splash plate or some other device on the bottom of the pit to reduce side-wall erosion and excessive disturbance of the pit bottom. Excessive erosion and disturbance may result in clogging and yield lower than actual infiltration rates.
- Add water to the pit at a rate that will maintain a water level between 3 and 4 feet above the bottom of the pit.

**Note:** A water level of 3 to 4 feet provides for easier measurement and flow stabilization control. However, the depth should not exceed the proposed maximum depth of water expected in the completed facility.

Every 15 to 30 minutes, record the cumulative volume and instantaneous flow rate in gallons per minute necessary to maintain the water level at the same point (between 3 and 4 feet) on the measuring rod. This

can best be accomplished with an in-flow meter. It can also be accomplished by timing how long it takes to fill a known volume such as a 5-gallon bucket.

Add water to the pit until 1 hour after the flow rate into the pit has stabilized (constant flow rate) while maintaining the same pond water level (usually 17 hours).

After the flow rate has stabilized, turn off the water and record the rate of infiltration in inches per hour using the pressure transducer or measuring rod, until the pit is empty.

### **Data Analysis**

Calculate and record the infiltration rate in inches per hour until 1 hour after the flow has stabilized.

**Note:** Use statistical/trend analysis to obtain the hourly flow rate when the flow stabilizes. This would be the lowest hourly flow rate.

### **Apply Correction Factor**

The infiltration rate obtained from the PIT shall be considered to be a short-term rate. This "short-term" rate must be reduced through correction factors to account for site variability and number of tests conducted, degree of long-term maintenance and influent pretreatment/control, and potential for long-term clogging due to siltation and bio-buildup. The corrected infiltration rate is considered the "long-term" or "design" infiltration rate and is used for all BMP sizing calculations.

One exception to the requirement for a correction factor applies to bioretention facilities. Specifically, when imported bioretention soil is used, no correction factor is required for the infiltration rate of the underlying native soil.

A minimum infiltration rate correction factor of 2.0 is required for all facilities designed using the PIT method. Correction factors greater than 2.0 should be considered for situations where long-term maintenance will be difficult to implement, where little or no pretreatment is anticipated, or where site conditions are highly variable or uncertain. These situations require the use of best professional judgment by the site engineer and the approval by the City of Edmonds. The typical range of correction factors to account for these issues, based on Ecology's guidance, is summarized in Table C-2. In no case shall the design infiltration rate exceed 10 inches per hour.

Table C-2: Correction Factors to be Used With In-Situ Infiltration Measurements to Estimate Long-Term Design Infiltration Rates

Issue	Partial Correction Factor
Site variability and number of locations tested	CFv = 1.5 to 6
Degree of long-term maintenance to prevent siltation and bio-buildup	CFm = 2  to  6
Degree of influent control to prevent siltation and bio-buildup	CFi = 2 to 6

Total Correction Factor (CF) =  $CF_v + CF_m + CF_i$ 

The following discussions are to provide assistance in determining the partial correction factors that may apply.

Site variability and number of locations tested — The number of locations tested must be capable of producing a picture of the subsurface conditions that fully represents the conditions throughout the facility site. The partial correction factor used for this issue depends on the level of uncertainty that adverse subsurface conditions may occur. If the range of uncertainty is low—for example, conditions are known to be uniform through previous exploration and site geological factors—one pilot infiltration test may be adequate to justify a partial correction factor at the low end of the range. If the level of uncertainty is high, a partial correction factor near the high end of the range may be appropriate. This might be the case where the site conditions are highly variable due to a deposit of ancient landslide debris, or buried stream channels. In these cases, even with many explorations and several pilot infiltration tests, the level of uncertainty may still be high. A partial correction factor near the high end of the range could be assigned where conditions have a more typical variability, but few explorations and only one pilot infiltration test is conducted. That is, the number of explorations and tests conducted do not match the degree of site variability anticipated.

**Degree of long-term maintenance to prevent siltation and bio-buildup** – a partial correction factor at the low end of the range may be used if there is certainty that maintenance requirements will be carried out consistently. If there is a high degree of uncertainty that long-term maintenance will be carried out consistently, or if the maintenance plan is poorly defined, a partial correction factor near the high end of the range may be justified.

**Degree of influent control to prevent siltation and bio-buildup** – A partial correction factor near the high end of the range may be justified under the following circumstances:

- If the infiltration facility is located in a shady area where moss buildup or litter fall buildup from the surrounding vegetation is likely and cannot be easily controlled through long-term maintenance
- If there is minimal pre-treatment, and the influent is likely to contain moderately high TSS levels.

If influent into the facility can be well controlled such that the planned long-term maintenance can easily control siltation and biomass buildup, then a partial correction factor near the low end of the range may be justified.

The determination of long-term design infiltration rates from in-situ infiltration test data involves a considerable amount of engineering judgment. Therefore, when reviewing or determining the final long-term design infiltration rate, the local jurisdictional authority should consider the results of both textural analyses and in-situ infiltration tests results when available.

### Example:

The area of the bottom of the test pit is 8.5 feet by 11.5 feet.

Water flow rate was measured and recorded at intervals ranging from 15 to 30 minutes throughout the test. Between 400 minutes and 1,000 minutes, the flow rate stabilized between 10 and 12.5 gallons per minute or 600 to 750 gallons per hour, or an average of (9.8 + 12.3) / 2 = 11.1 inches per hour.

Applying at least the minimum correction factor of 2.0 (example only) the design long-term infiltration rate becomes 5.6 inches per hour, anticipating adequate maintenance and pre-treatment.

## **Affidavit of Publication**

### STATE OF WASHINGTON, **COUNTY OF SNOHOMISH**

S.S.

Summary of Ordinance No. 3792



On the 20th day of April, 2010, the City Council of the City of Edmonds, passed Ordinance No. 3792. A summary of the content of said ordinance, consisting of the title, provides as follows:

AN ORDINANCE OF THE CITY OF EDMONDS, WASHINGTON, REPEALING AND REENACTING CHAPTER 18.30 STORM WATER MANAGEMENT OF THE EDMONDS COMMUNITY DEVELOPMENT CODE, PROVIDING FOR THE APPLICATION OF EXISTING CHAPTER 18.30 TO VESTED PERMITS, AND FIXING A TIME WHEN THE SAME SHALL BECOME EFFECTIVE. The full text of this Ordinance will be mailed upon request. DATED this 21st day of April, 2010.

CITY CLERK, SANDRA S. CHASE Published: April 26. 2010.

RECEIVED

EDMONDS CITY CLERK

APR 29 2010 .

Account Name: City of Edmonds

Published: April 26, 2010.

The undersigned, being first duly sworn on oath deposes and says that she is Principal Clerk of THE HERALD, a daily newspaper printed and published in the City of Everett, County of Snohomish, and State of Washington; that said newspaper is a newspaper of general circulation in said County and State; that said newspaper has been approved as a legal newspaper by order of the Superior Court of Snohomish County and that the notice

Storm Management	
a printed copy of which is hereunto attached, vsupplement form, in the regular and entire edit times, namely:	was published in said newspaper proper and not i ion of said paper on the following days and
April 26, 2010	
and that said newspaper was regularly distributed to the said newspaper was re	
	Principal Clerk
Subscribed and sworn to before me this	26th
day of April, 2010	D. C. Lul
Notary Public in and for the State of War County.	The sum that line at Everett, Snohomish
Account Number: 101416	5-19 Number: 0001693595